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Country Market Sectoral Survey



INDONESIA

A Survey of U.S.
Business Opportunities

U.S. DEPARTMENT OF COMMERCE
Domestic and International Business
Administration
Bureau of International Commerce

International Marketing Information Series

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Country Market Sectoral Survey

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U.S. DEPARTMENT OF COMMERCE
Domestic and International
Business Administration
Bureau of International Commerce

May 1977

MEMORANDUM

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FROM : [illegible]
SUBJECT : [illegible]



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Preface

This is a survey of major Indonesian economic sectors to identify business opportunities for U.S. firms. The *Overview* assesses Indonesian development prospects and highlights survey findings. The individual *industry reports* describe sector structure and dynamics; identify key government and business organizations; discuss major development objectives, trends, programs, and projects; identify principal requirements for capital goods, technology, and services; evaluate the competitive environment in which U.S. firms must operate; and outline important marketing considerations.

The survey is based on market research performed in Indonesia by Mobius Research Inc. of Hong Kong, under contract to the U.S. Department of Commerce. Field work was conducted from April through October 1976. It was under the guidance of Sectoral Survey Manager Joseph A. Whelan and Field Project Manager Franklin J. Kline of the U.S. Department of Commerce. Support and assistance was provided by the U.S. Foreign Service, U.S. Department of State. The survey method emphasized extensive interviews with Indonesian businessmen and government officials, and visits to major project sites to verify and update information from secondary sources and official statistics.

Indonesia's "Second Five Year Development Plan" (Rencana Pembangunan Lima Tahun II—Repelita II), 1974/75–1978/79, and official trade and economic statistics were a major source of the data and projections shown in this survey. It should be noted that Repelita II, while setting overall development objectives and priorities, provides only for public sector spending allocations. A number of factors with both favorable and negative implications on the availability of development funds in Indonesia have occurred in the world and the Indonesian economy since the original Repelita II projections were developed. These have been identified and updated in this report, where applicable.

Substantial amounts of Indonesian imports are not recorded in official trade statistics because of customs irregularities; or because they enter under special duty facilities in connection with projects. Indonesian data were checked against trade and other statistics published by major trading partners and international assistance agencies. Figures in the report frequently represent estimates and projections adjusted from official sources by the contractor, based on extensive trade interviews.

All data for 1976 and subsequent years are estimates and projections. Dollar values in the report are converted from Rupiah at current prices (since August 1971 the exchange rate has been Rupiah 415=US\$1). The Indonesian fiscal year runs from April 1 to March 31. Both fiscal year and calendar year data are shown in this report; fiscal years appear as "1976/77" (year ending March 31, 1977).

This survey is one of a series of in-depth reports on business opportunities in countries which are important U.S. trading partners. Country selections are made because of dynamic developments in their economies and a high level of interest by the U.S. business community; or because of significant changes in their trade relations with the United States. Surveys completed to date include Brazil, Nigeria, and Venezuela. Other surveys either in progress or planned include Iran and Japan. The Department of Commerce welcomes comments on the usefulness of this survey and suggestions that will make future reports more responsive to your needs. Send comments to: Director, Market Research Division (DIBA), U.S. Department of Commerce, Washington, D.C. 20230.

Introduction

From earliest historical times the archipelago nation of Indonesia has been a strategic passage between two oceans—the Pacific and the Indian—and a link between two continents—Asia and Australia. In the first century A.D., Hindu merchants visited the islands and began a prosperous trade in exotic spices. Indonesia's two great empires, the Sriwijaya and Majapahit in the 9th and 14th centuries respectively, became powerful by gaining control of the international trade passing through the Straits of Malacca. Later Chinese and then Portuguese, Dutch, and English seafarers joined in the trade with the "Spice Islands." In 1619, the Dutch established their first bridgehead in Java and began the process of expanding their control throughout the archipelago. This process was not completed until the 20th century, although in the 17th century the archipelago became known as The Dutch East Indies.

The Dutch dominated the Indonesian archipelago for about 300 years until 1942 when the Japanese occupied Indonesia at the beginning of World War II. Under Dutch rule various policies were promulgated on Java which greatly influenced later economic development. In the 18th century the Dutch began to rely on Chinese entrepreneurs to act as middlemen in trade, agriculture, and industry. Through this process, the indigenous entrepreneurial class was largely eliminated and its strength has not yet recovered. In the 19th century, roughly between 1830–1870, the Dutch established the "cultivation system" and "net profit" policy. This forced the peasants to produce a varying percentage of export crops. The Javanese local aristocracy was established as a hereditary civil service for the Dutch and exercised almost feudal powers. The intensive development by the Dutch in Java spurred population growth and resulted in the heavy population imbalances in Indonesia which exist today, while the authoritarian and elitist Dutch approach to government administration continues to influence the civil service. Indonesians of Chinese descent continue to play a major role in the economy.

An independence movement arose in Indonesia in the early 1900's. After the Japanese surrendered the nationalists proclaimed the independence of the Indonesian Republic on August 17, 1945. There followed 4 years of struggle against the Dutch who attempted to reestablish their control over the archipelago. Finally, under international pressure, the Dutch withdrew their military forces at the end of 1949 and recognized the sovereignty of Indonesia except for New Guinea. In 1968, it became part of Indonesia as West Irian. During 1950–57 the Indonesians tried unsuccessfully to govern their country with a system of parliamentary democracy based on the Western European pattern. As parliamentary government became increasingly ineffective, President Sukarno, the charismatic "father of the Indonesian Republic," gradually assumed more and more power. In the late 1950's, Sukarno dismissed the elected parliament and introduced an authoritarian system of government which he called "Guided Democracy." At the same time, he nationalized most of the foreign enterprises in the country and pursued radical nationalist and anti-western policies. Sukarno emerged as a spokesman of the "left wing" developing countries which he pictured as victims of the imperialistic "Old Established Forces." Under "Guided Democracy" the economy of Indonesia deteriorated rapidly as production and trade declined and prices soared. In the early 1960's, the Communist Party of Indonesia (PKI) grew rapidly, and Indonesia became closely aligned with

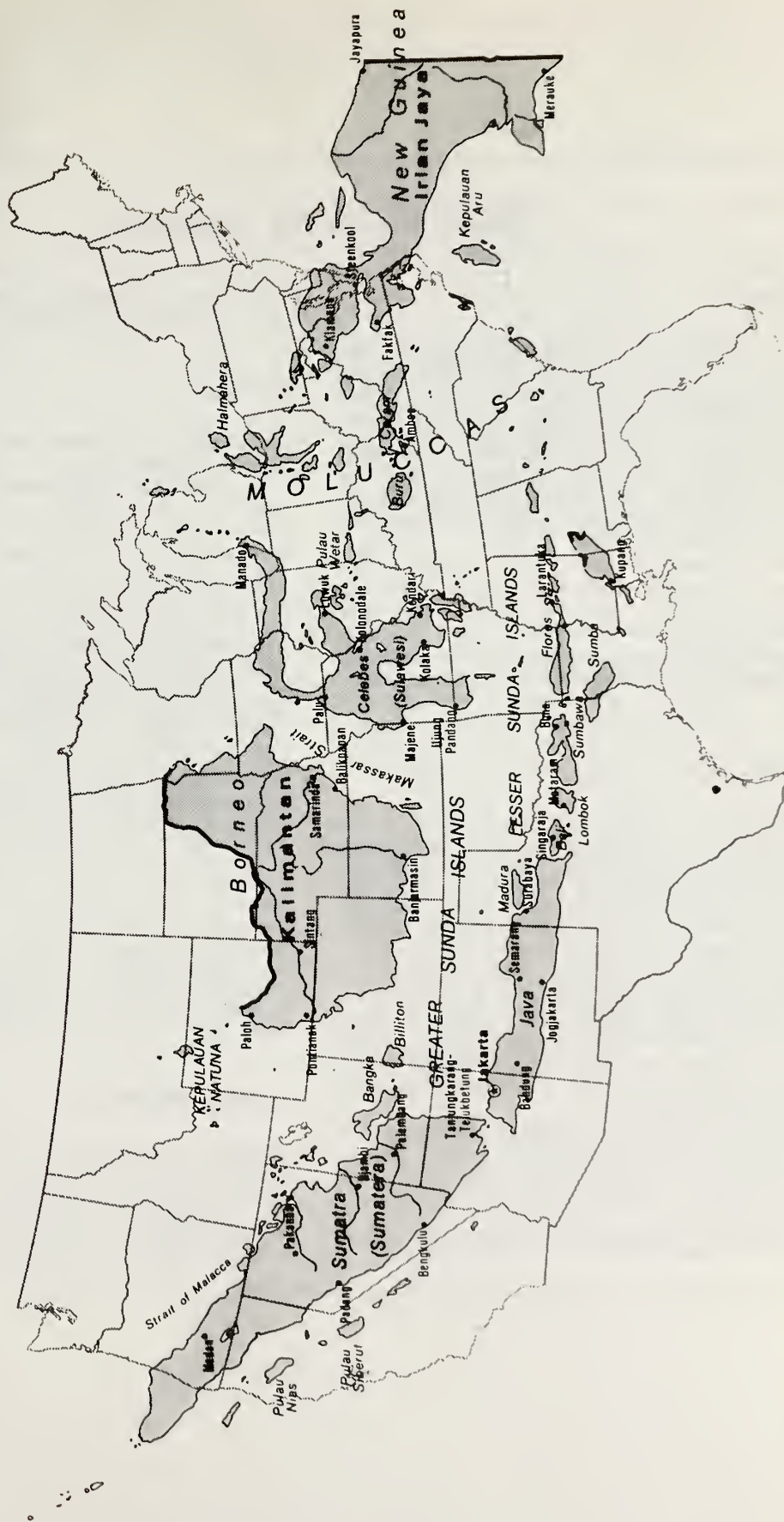
the Peoples Republic of China and the U.S.S.R. A campaign was inaugurated to incorporate Dutch New Guinea into the Republic and a military "confrontation" with the neighboring states of Singapore and Malaysia was launched.

The situation changed abruptly after September 30, 1965. This was the date of an abortive communist coup which led to fundamental changes in Indonesia's political life. Within 18 months Sukarno was removed from power. General Suharto, Chief of the Army's Strategic Command, established control of the government and rallied the country to eliminate the Communist Party. What followed was a national catharsis against communism which extended to the village level. In 1967, General Suharto became "functioning" president and in 1968, he was elected president for a 5-year term.

The "New Order" was introduced by Suharto. It was composed of a moderate army leadership cooperating with civilian "technocrats" whose first priority was economic and social development. Work began on economic stabilization in 1967. Measures were taken to attract foreign capital investment. The Inter-Governmental Group for Indonesia (IGGI) was established by the leading western countries to coordinate assistance. Measures were taken to stabilize the rampant inflation which had increased roughly 650% between 1951 and 1961.

In July 1971, general parliamentary elections were held following the passage of the Election Law which allowed for government appointment of a certain number of seats. The results of this election showed the relative strength of the government-supported party—GOLKAR.

On March 23, 1973, President Suharto was reelected to another 5-year term of office. The Government has taken a new course of action since the establishment of the Second Five Year Plan 1974/75. Its emphasis is on employment generation, improved income distribution, and rural development. The gravity of the social and economic problems facing the country has been further realized by the Government as a result of riots in Bandung against the Chinese in 1973 and against Japanese economic domination in Jakarta in 1974.



Basic Facts on Indonesia*

Resources

Land.—Archipelago lying along the equator, stretching 3,200 miles southeast from Asian mainland toward Australia. Land area 782,700 square miles, including some 13,000 islands ranging from small reefs to areas about the size of France. Most land area concentrated in five major islands: Sumatra (Sumatera), Java (Jawa), Borneo (Kalimantan), Celebes (Sulawesi) and West New Guinea (Irian Jaya). Topography mountainous with some active volcanoes; many lakes, rivers, and swamplands. Over 60% of land is forested.

Climate.—Tropical monsoon climate marked by low winds, high humidity. Daily high and low temperature range between 86°F and 68°F. Rainy season varies throughout archipelago, September to April in Jakarta.

Minerals.—Varied and extensive. Major minerals produced: petroleum, natural gas, tin, copper, nickel, bauxite, coal.

People

Population.—135 million (estimated mid-1976), making Indonesia the fifth most populous country in the world. Population growth rate 2.5%. According to official census (1971) 54% of population was under 20. About 82% lived in rural areas. Over 300 ethnic groups. The major one is Javanese, 40% of total population. Labor force 46 million (estimated 1976), over 50% in agriculture.

Language.—National language "Bahasa Indonesia" a Malayo-Polynesian language. English is widely spoken in government and business circles. Other important languages include Javanese, Sudanese, Arabic, Chinese and Dutch; there are several hundred regional dialects.

Religion.—About 90% Islam, others include Hinduism, Buddhism, Christianity.

Education.—Adult literacy estimated at 60%, 19% of population are elementary school graduates, 2% are high school graduates, and less than 0.5% are graduates of Universities or advanced secondary institutions. Ele-

mentary school enrollment in 1972 was 13 million, secondary school 1.8 million, and higher education 136,500.

Political

The Republic of Indonesia was known as the Netherlands East Indies during the Dutch colonial period which lasted about 350 years. Independence declared August 17, 1945, followed by armed struggle lasting through 1949, when Dutch withdrew.

Government.—Unitary Republic with government and political institutions drawing legal sanctions from Constitution of 1945, which provides for Presidential system with strong executive power.

Administration.—Divided into 27 provinces, further subdivided into Regencies (Kabupaten), Districts (Kecamatan), subdistricts (Kewedanaan), and Villages (desa, kampung, nagrai). Government services at local level (health, education, etc.) provided through branches of central government departments.

International.—Following a nonaligned foreign policy, Indonesian interests have been close to the United States and Europe since the abortive 1965 communist coup. Except for short hiatus during radical Sukarno era, Indonesia has been active member of United Nations. As largest and potentially most important regional power, Indonesia has taken lead in development of Association of Southeast Asian Nations (ASEAN), also a member of Colombo Plan. Indonesia is a member of Organization of Petroleum Exporting Countries (OPEC), although did not participate in 1973 oil embargo. Indonesia belongs to International groupings for coffee, tin and other commodities.

Foreign Investment

Indonesian Government continues to welcome foreign investment, but has issued new regulations to give a greater role to ethnic Indonesians, taking tougher bargaining positions with respect to concessions and incentives. Guarantees and incentives for new investments provided under Foreign Investment Law of 1967.

* Prepared with the assistance of M. Virginia Webbert, Indonesia Country Specialist, Office of International Marketing.

Authorized capitalization of approved nonoil foreign investment projects between 1967 and Dec. 31, 1975 totaled \$4,488 million. The real pace of foreign investment growth slowed during 1975, reflecting investor uncertainty over government investment policy. Largest investor is Japan (\$2 billion, 198 projects), followed by United States (\$520 million, 108 projects), Hong Kong (\$423 million, 107 projects), Philippines (\$302 million, 22 projects), and Federal Republic of Germany (\$175 million, 26 projects). Foreign oil contractors, predominantly U.S., expended more than \$3 billion between 1969 and 1975. Total U.S. direct investment position as of Dec. 31, 1975 was \$1.6 billion, of which \$1.3 billion was in the petroleum industry and \$94 billion was in manufacturing.

Economy

GNP.—Estimated at \$22.5 billion at current prices in 1974, per capita GNP an estimated \$130. GNP growth rate in 1974 was 7% compared with 7.5% per annum target set for current 5-year plan, and was lower in 1975, reflecting depressed world economy. Agriculture (including forestry and fishing) contributed 40% of GNP in 1973/1974, mining and petroleum 10%, and industry and construction 14%.

Development Plan.—Second 5-year plan (Repelita II) beginning April 1, 1974, calls for investment of \$27 billion. Plan aims to ensure more equitable income distribution, and lay foundation for further economic growth.

Finance

Currency.—Rp. 415=U.S.\$1. No exchange restrictions. Money supply grew 36% in 1975. Inflation rate just under 20% in 1975, compared with 33% in 1974.

Domestic Credit and Investment.—New investment projects valued at \$4,158 million at the end of 1975.

Tightened credit policies implemented in early 1974. Some reduction in bank loan and deposit rates and several selective credit measures introduced in 1975 and early 1976.

National Budget.—Government follows conservative fiscal policy with balanced budget (expenditures and receipts \$6.5 billion for Indonesian fiscal year ending March 31, 1976). 1976/77 draft budget is \$8.45 billion, 45% of which funded by oil taxes. \$4.6 billion is ear-

marked for development. \$3.8 billion is devoted to routine expenditures.

Balance of Payments.—Balance of payments in 1975 came under heavy pressure from world recession, financial crisis of state oil company—*Pertamina*, and high import demand. Oil receipts, timber exports, and new foreign investment reduced. The requirement for the government to intervene and bail out *Pertamina*, made it necessary to draw down foreign exchange reserves.

Net foreign exchange reserves, \$1.5 billion at end of 1974, reduced to \$490 million at end of 1975. Debt service payments expected to be in excess of \$813 million in 1976 and imports expected to surpass 1975 level. Indonesia will rely on foreign aid, increased export earnings, direct foreign investment inflows to maintain its balance of payments in a favorable position.

Foreign Trade

Imports.—\$4.7 billion in 1975; \$3.8 billion in 1974. Major suppliers (1975): Japan (31%), United States (14%), West Germany, The Netherlands, Singapore, Australia. Trade with the Peoples Republic of China (PRC) and the Soviet Union, Eastern Europe, and North Korea is modest with former accounting for about 4% and latter about 5%. Major imports: Machinery, transport equipment, iron and steel products, fertilizer and other chemicals, cotton yarn, rice.

Exports.—\$7.4 billion in 1974, \$7.1 billion in 1975 (down 5%) of which major products petroleum (75%), timber (7%), rubber, palm oil, tin, coffee. Major customers are Japan, United States, West Germany, and The Netherlands.

Trade Policy.—Export expansion a priority objective, especially with value added by processing. Essentially a free trade system, tariffs, particularly on nonessential items; some protective nontariff barriers. Brussels tariff nomenclature adopted in 1973.

U.S. Trade Prospects.—Total U.S. exports to Indonesia \$810 million in 1975, are expected to exceed \$1 billion in 1976. Machinery principal item, increasing 68% over 1974 to \$317.9 million in 1975 with construction and mining equipment and electric power equipment leading categories. Transport equipment, including substantial aircraft purchases, was second at \$79.6 million, followed by fertilizer (\$87 million), iron and steel (\$52.8 million), cotton (\$4.2 million) and wheat (\$49.6 million).



Indonesia: An Overview For U.S. Business¹

Indonesia's potential for economic development is good when compared with other developing countries. The country's many islands have a large reservoir of low cost labor and a wealth of natural resources. It has a fertile soil which can grow rice, timber, rubber, coffee, oil palm, sugar, tea, and spices. Its abundant mineral resources include oil, natural gas, nickel, copper, bauxite and tin. Its people have committed themselves to improving their knowledge both in agricultural techniques and industrial production. For the past decade the country has maintained a moderate rate of economic growth. The Indonesian Government has for 10 years managed a relatively stable economy, based on a stable political environment and a sense of unity and national pride.

Stabilization was achieved within the framework of Rencana Pembangunan Lima Tahun I (Repelita I—The First Five-Year Development Plan which ended in March 1974). During that period the emphasis was on agriculture. The Government dealt mainly with the urgent need for rehabilitation of a deteriorated infrastructure and production facilities at a time when financial resources were very scarce. Private domestic and foreign investment in manufacturing also was encouraged. The first plan went a long way toward achieving many of its goals. There are growing exports of lumber, rubber, palm oil, and coffee. Rice production, while growing at a rate keeping pace with the expanding population, is still below domestic consumption, and substantial amounts have to be imported.

A decade ago Indonesia had little industry. Today, progress has been such that self-sufficiency can be expected soon in cement and fertilizer. Petroleum production has increased rapidly and production of copper concentrates, iron sands, and nickel has begun in addition to tin and bauxite. Certain segments of the food, textile, and chemical industries have achieved rapid growth although there have been the concomitant growing pains. In the food industry, sweetened condensed milk production has grown

fast while much of the rest of the industry has remained unchanged. In the textile industry, knitting has progressed while there is underused capacity in cotton spinning.

Jakarta and other cities have acquired some of the visible signs of modern urban life. Irrigation, transport, electric power, and other infrastructure facilities have improved and expanded, and education facilities and school enrollment have greatly increased.

Indonesia's Second Five-Year Development Plan (Repelita II) for fiscal years 1974/75–1978/79 was introduced on April 1, 1974. (The Indonesian fiscal year runs from April 1 to March 31.) The plan aims to continue to raise real income and lay a stronger foundation for further economic growth by: Increasing the supplies of food and clothing, housing materials, and other essential commodities for the general public; expanding and improving infrastructure; ensuring a more equitable distribution of the benefits of development; expanding social welfare facilities; creating more employment opportunities. Like the First Five-Year Development Plan, the current plan is an indicative plan, establishing priorities that determine the direction of growth.

Real gross domestic product (GDP) is projected to increase at 7.5% annually, compared to a targeted growth rate of 5% during the first 5-year plan and an actual annual growth rate of about 7%. Total public sector investment is estimated at Rp. 11,023.4 billion (\$26.6 billion at the current exchange rate, Rupiah 415=U.S.\$1) for the 5-year period. As a percentage of GDP, investment is expected to increase from 17.7% in 1973/74 to 22.9% in 1978/79. Foreign resources will continue to make an important contribution although their share of total investment is expected to decline from 39% in 1974/75 to 22% in 1978–79. (See figure 1.)

The planned contribution by the major economic sectors to GDP by the end of the Second Plan in March 1979, as compared with the end of the First Plan in March 1974, and the average annual sectoral growth rates to achieve the overall growth objective are shown in the following table:

¹ Based in part on OBR 77-05, Marketing in Indonesia, March 1977, prepared by M. Virginia Webbert.

Jakarta (facing page) and other major Indonesian cities are rapidly acquiring the characteristics of modern urban life.

Sector	Share of GDP		Average Annual Growth
	1973/74	1978/79	
Agriculture	40.1%	35.0%	4.6%
Mining	9.6%	10.8%	10.1%
Industry	9.8%	12.6%	13.0%
Construction	3.8%	4.1%	9.2%
Transport and Communications ..	4.1%	4.6%	10.0%
Other Sectors	32.6%	32.9%	7.7%
Total GDP ...	100.0%	100.0%	7.5%

The second 5-year plan initially earmarked the largest percentage (19.1%) totalling \$2,413 million of public spending for agriculture and irrigation. Allocations to other sectors include \$1,267 million to education, \$2,242 million to regional development, \$938 million to electricity, and \$2,004 million to communications and tourism (see table 1).

Table 1.—Indonesia: Projected National Development Budget by Sectors for Repelita II

Sector	US\$ Millions
Agriculture and Irrigation	2,413
Industry and Mining	448
Electricity	939
Communications and Tourism	2,004
Trade and Cooperatives	91
Manpower and Transmigration	17
Regional Development	2,242
Religion	36
Education	1,267
Health	463
Housing and Water Supply	245
Law and Order	72
Defense and Security	304
Information	64
Research and Statistics	244
Government Apparatus	296
Government Investment	1,356
TOTAL	12,501

Source: Repelita II.

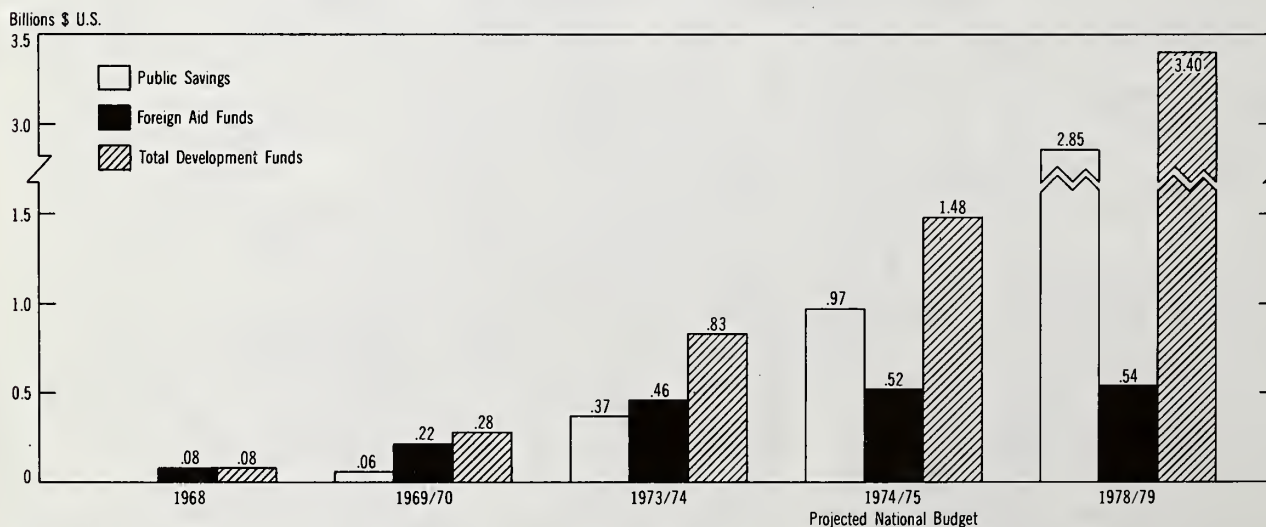
THE PETROLEUM INDUSTRY

Repelita II was prepared before the large increases in the price of oil in late 1973 and early 1974 and the revision in the income-sharing arrangements with the foreign oil companies. These developments substantially improved Indonesia's financial position and greatly improved its balance of payments. The Government responded to this more favorable economic situation by increasing development expenditures in the 1974/75 budget, by raising planned expenditure for the remaining years of the Plan, and by expanding foreign borrowing.

In 1973 and 1974, the sharp increase in oil and other commodity export prices led to the judgment that both current consumption and investment could be increased substantially. However, in 1974/75, the Indonesian economy encountered some difficult problems which had been accumulating since the early 1970's.

First, the Pertamina financial crisis broke. In 1975 it became clear that Pertamina, the Government-owned oil company, had overextended its resources in heavily capital intensive investment for natural gas liquefaction, petrochemicals, pipelines, and ocean-going tankers, as well as for such nonpetroleum related activities as steel, office and hotel building, housing, agro-industry, and telecommunications. The company made substantial short-term loans at high interest rates in order to avoid government controls on its long-term borrowing. As a result of tightening international money markets Pertamina became unable to cover these obligations. Its inability to finance its debts reached a crisis level. To assure creditors and foreign investors of the stability of the nation, the Central Bank stepped in to assist Pertamina in servicing its legitimate debts.

Figure 1.—Indonesia: Repelita II, Sources of Development Funds, Original Projections



Source: Repelita II

This required the Government to pay out at least \$1.55 billion in foreign exchange. Pertamina also had withheld from the Government \$1 billion in revenue from foreign oil companies which it was legally obliged to pass to the Central Bank. In short, the company had preempted a substantial part of the resources which the Government had expected to be available to further development aims and objectives established for Repelita II.

Although Indonesia's debt is large, international organizations, bankers, and bilateral aid donors have demonstrated their continuing judgment that the country's financial managers and economic policymakers are fully capable of assuring sound management within the constraints imposed by the Pertamina problem and world economic conditions.

In coping with the Pertamina crisis, the Government launched a comprehensive reexamination of Pertamina's investment programs. As a result it decided to reduce, delay, or abandon many of the on-going and planned Pertamina projects. The renegotiation of Pertamina's contracts met with success. Full government control was imposed on all foreign borrowings of Pertamina, all public sector firms, and government operating units. The Pertamina "shock" in the long run, may have been beneficial to the country. It resulted in a tightening of both Pertamina management and Government management in general.

FISCAL RESOURCES

A second factor which added to Indonesia's financial difficulties in 1975 was the world recession. Because of the unexpected decline in consumption in Indonesia's principal export markets, oil revenues fell substantially short of anticipated levels. As a result of this shortfall in government receipts and increased debt repayment obligations, reliance was placed on commercial foreign credits and on the domestic banking system to finance a large share of investment by public enterprises. The use of substantial amounts of Bank Indonesia and state commercial bank credit to finance public sector projects in 1975 was a major departure from the previous policy of matching budget expenditures with revenues and foreign assistance.

Oil exports declined 5% in volume from 501.8 million barrels (bbl) in 1974 to 476.8 million bbl in 1975. Despite higher average prices, 1975 gross oil export proceeds amounted to only \$4.9 billion as against \$5.1 billion in 1974, a 3% decline in value. Also hit by falling prices, proceeds from nonoil exports decreased by 17% from \$2.2 billion in 1974 to \$1.8 billion in 1975. Timber exports suffered the

most, declining 30% from \$725 million to \$503 million. Rubber exports dropped from \$487 million to \$371 million.

Confronted by such problems, the Indonesian Government decided that foreign borrowing must be cut back sharply. The anticipated 1976 level of about \$3.4 billion will be cut to \$2.1 billion in 1977 and \$2 billion in 1978, before being allowed to rise again in 1980 to about \$2.9 billion, and to \$5.8 billion in 1985. These projections have been approved by the Inter-Governmental Group for Indonesia (IGGI), Indonesia's economic assistance consortium. Borrowing emphasis will be shifted toward concessional and semiconcessional loans along with anticipated funding from Middle East oil producers, Eastern European Governments, and supplier export credits. The Government also plans to improve domestic tax revenues in the next few years. This will be done much faster and to higher levels than was originally contemplated.

A large part of the planned or proposed public sector investment program already has been reduced by replanning, delaying, or cutting some Pertamina projects. The Government intends to defer some of the new large capital-intensive projects or to increase the role of private equity participation in them. It also plans to reject or defer proposals for the purchase of costly equipment or the start-up of major projects in some sectors. Government planners believe that this selective imposition of restraints on investment should minimize and perhaps eliminate the need for reducing other planned programs. However, with the continued emphasis of the public sector investment program there will be new investment in transport and power to support industrial growth. While balance of payments constraints are anticipated over the next 5 years, they may not be as serious as originally anticipated. Net foreign exchange reserves fell by \$364 million in FY 1975/76 to \$557 million at the end of March 1976. However, a rise in reserves in the latter part of 1976 indicated a substantial improvement in the balance of payments in FY 1976/77. This rise is due principally to the better than expected performance in nonoil exports, an increase in the government's share of petroleum revenues following a renegotiation of contracts with the foreign oil companies, and relief from the unanticipated debt payments for Pertamina required in FY 1975/76. If Indonesia's foreign reserve position continues to improve, the Government should be able to stretch out its debt service burden, now expected to peak at around 19% in 1979, and relax the spending controls it has imposed on all government departments. Much depends on continued worldwide recovery from economic recession.

HUMAN RESOURCES

In any discussion of long-term prospects for Indonesia, population and employment concerns must rank high. The 1976 population was 135 million with population density on the inner islands of Java, Madura, and Bali about 600 per square kilometer. In some of the more fertile areas, the density reaches 2,000 per square kilometer. Large areas of the outer islands are sparsely populated and generally underexploited, but some of these areas are less capable of supporting a large number of people.

The present population growth rate is estimated at 2.5% annually. Since 1969, the Government has been operating and gradually extending a family planning program. The number of acceptors has been increasing rapidly and the number of clinics which render family planning services has exceeded Repelita II targets by more than 10% in the first 2 years. Repelita II foresees a much more comprehensive attack on the population problem by pervading government policies with population concerns wherever possible.

During the rest of the 1970's, average annual additions to the labor force are estimated at 1.2 million, increasing to more than 1.4 million in the years 1980-85. In addition, there is substantial initial underemployment and the risk that even relatively simple technological improvements may eliminate existing employment. The employment-oriented strategy of the current national plan is an essential element in the government's attempt to spread the benefits of development.

The initial breakthrough towards an improvement in employment depends on the direct creation of substantial work opportunities by the Government in such activities as transmigration, urban and rural public works, etc. The process of transmigration, i.e., transferring population and capital to less developed parts of the outer islands, is necessarily slow and costly. Considerable capital investment needs to be combined with much investigation, research, and technical and managerial assistance to the new settlers if the program is to be successful. Current plan targets call for the transmigration of 100,000 families by 1979.

The current plan aims at increasing employment opportunities especially in the rural areas. Agriculture employs about 70% of Indonesia's active population. Less than 8% of the work force is employed in mining and manufacturing. While the work force is expected to increase by 2.5% annually, significantly higher annual growth rates are projected for employment in manufacturing (6.5%), construction (5.5%), financial institutions (5.4%), trade (4.2%), and services (4.1%). Employment in agri-

culture and mining is projected to increase at annual rates of 0.9% and 1.8% respectively.

FOREIGN ASSISTANCE, FOREIGN INVESTMENT, AND FOREIGN TRADE

Over \$900 million in loans and grants were utilized in FY 1975/76 to finance imports and these may double in FY 1976/77. The IGGI pledged \$1.12 billion to Indonesian in FY 1976/77 of which \$450 million will be official bilateral development assistance and \$670 million semiconcessional loans from the International Bank for Reconstruction and Development (IBRD) and the Asian Development Bank (ADB). Some \$50 million in technical assistance will be provided. Semiconcessional export and commercial credits outside the IGGI framework valued at about \$1 billion are also anticipated. U.S. assistance will be well over \$100 million. A total of over \$5.1 billion (excluding Grant Technical Assistance) was pledged for Indonesia through the IGGI mechanism during the years 1967-75/76.

In addition to the heavy public sector spending by the Government, investment by the private sector, both domestic and foreign, also has contributed substantially to economic growth. Authorized capitalization of approved investments under the 1968 Domestic Investment Law totalled \$4.2 billion at the end of 1975 (over two-thirds were in industry) of which \$616 million had been approved in 1975 alone. Authorized capitalization of approved investment under the 1967 Foreign Investment Law in fields other than oil totalled \$4.5 billion by the end of 1975. Despite a slowdown in new investment interest, many approved contracts remained to be implemented. Inflows from foreign direct investment amounted to about \$500 million annually in 1975 and 1976, while exploration and production expenses of foreign oil companies totalled around \$1 billion annually.

Between 1967 and 1973, the Government's investment policies were pragmatic and liberal. The result was an influx of investment commitments which reached a record high of \$666 million (excluding the petroleum industry) in the first half of 1974. However, with the intensification, that year, of economic nationalism, highlighted by the riots and demonstrations during the visit of Prime Minister Tanaka of Japan, the Government introduced a number of changes which resulted in a slowdown of foreign investment.

Most significant of these new investment policies was the requirement for increased Indonesian ownership of joint ventures within 10 years. New schedules requiring "Indonesianization" of employment envisage replacement of expatriates in all but

top executive jobs within 3 to 5 years. Incentives for foreign investment in various sectors have been reduced and several sectors have been closed to foreign investment. However, it is important to note that there is considerable flexibility in the Government rulings. (For a more detailed discussion of Indonesian Government foreign investment policies and procedures see the appendix to this survey entitled "Investment in Indonesia.")

New foreign investment application approvals during 1975 showed an overall growth of 17% raising the total to approximately \$1.8 billion. That figure, however, is heavily weighted by the inclusion of the huge (\$870 million) Asahan River hydroelectric and aluminum smelter project in Sumatra. Without that single Japanese-Indonesian Government joint venture, the figures for 1975 would have shown a very sharp decline.

Apart from the Asahan River project there were other foreign investment landmarks in 1975. In October, the State coal mining enterprise signed a pioneering production-sharing contract with N.V. Shell Mijnbouw to govern coal exploration, development, and export in a very large area of South Sumatra. P.T. Inco neared completion of the first phase of a nickel mining and processing facility in South Sulawesi.

It is expected that the rate of foreign investment should pick up as the world economic outlook brightens and the Indonesian Government's policies are clarified. The Government became so concerned with the fall-off in new foreign investment in 1975 that it undertook an overseas public relations campaign, sending a number of senior officials to the United States and Europe.

It is important to distinguish between investment approvals and actual investment money dispersed in project implementation. For example, in the 1970 to 1975 period total authorized capitalization of approved foreign investment reached \$5.2 billion while actual implementation was valued at about \$2.1 billion, representing an implementation rate of about 40% (see table 2).

Table 2.—Indonesia: Foreign Investment Project Approvals and Implementation, 1970 to 1975

	(In US\$ Million)	
	Approvals	Implementation
1970	344.9	138.2
1971	426.1	218.3
1972	522.2	270.9
1973	655.2	393.8
1974	1,497.8	633.9
1975	1,762.2	421.4
TOTAL	5,208.4	2,076.8

Source: Capital Investment Coordination Board (BKPM).

Between 1967 and 1975 foreign investment approvals were predominantly in manufacturing with 447 of the total 790 projects approved and 43% of total capitalization in that area. Leading manufacturing investment sectors were textile (15% of total investment capitalization); cement, glass, and ceramics (9%) and metalworking (7%). Other major areas of foreign investment interest were forestry (with 13% of the total foreign investment commitment), mining (10%), and construction and real estate (10%). (Table 3).

Table 3.—Indonesia: Foreign Investment Approvals by Sector, January 1967 to December 1975

Sector of Industry	Total Projects	Capitalization in US\$
<i>Manufacturing</i>		
Textiles	65	707,899,124
Cement, Glass, Ceramics, etc.	35	395,244,916
Metalworking	60	315,104,000
Food, Beverages, Seasoning	35	79,519,083
Pharmaceuticals, Cosmetics	44	65,164,340
Rubber: Tires, Milling	11	39,528,000
Electrical Goods, Household Appliances ...	25	36,247,648
Containers	16	27,831,800
Other	156	254,648,261
Total Manufacturing	447	1,921,187,172
Agriculture, Land Development, Fisheries .	61	105,816,858
Forestry, etc.	90	568,155,890
Mining	15	460,109,000
Real Estate, Tourism, Construction/		
Contracting	97	440,406,206
Other	80	992,381,619
GRAND TOTAL	790	4,488,056,745

Source: Capital Investment Coordination Board (BKPM).

Japan was the leading foreign investor with a total of 198 projects valued at \$2,046 million. The United States followed with 108 projects approved and capitalization of \$520.6 million. (Table 4). It is

Table 4.—Indonesia: Investment Approvals by Country, January 1967 to December 1975

Country	Total Projects	Capitalization in US\$
United States	108	520,616,264
Australia	44	66,835,000
Belgium	15	19,818,802
Canada	3	80,098,065
France	9	52,863,000
Germany (West)	26	175,098,333
Hong Kong	107	422,977,311
India	14	53,748,778
Japan	198	2,046,075,063
Korea (South)	18	102,710,000
Malaysia	33	55,790,000
Netherlands	42	163,376,218
Panama	5	11,470,000
Philippines	22	301,800,000
Singapore	46	119,357,034
Switzerland	16	58,756,000
Thailand	9	8,800,000
United Kingdom	44	65,671,522
Other Countries	31	162,195,355
TOTAL	790	4,488,056,745

Source: Capital Investment Coordination Board (BKPM).

important to remember that trade is inextricably intertwined with investment. Japanese trading companies have made large investments in Indonesia and have sold large quantities of equipment by tying their investments to equipment purchases.

The role of major development projects in creating a market for U.S. goods and services should not be underestimated, even where they are being mainly financed by countries other than the United States. In addition to the Asahan River Project, a petrochemical complex for North Sumatra is under consideration, as is an aromatics plant for South Sumatra. Between 1977 and 1986, five new fertilizer plants are planned.

The Krakatau integrated steel project is being developed in West Java by German companies. The first phase has been reduced in scope but will still remain a significant project, as it expands to take full advantage of the economies of scale necessary to make it a viable operation. The industrial development of Batam Island in the Indonesian Riau near Singapore has been slowed by Pertamina financial constraints and reduced investor interest in a proposed refinery. However, because of its location near Singapore, the island has gained a toehold as a logistics base and transshipment point for other projects. Future Batam investment will have to come entirely from private sources. Freeport Indonesia is contemplating the added investment costs for initiating underground mining for its copper deposits in Irian Java.

The P.T. Inco (International Nickel Company) nickel project is underway. Several other major mining and/or mineral development investments, principally in alumina/bauxite and nickel, are under consideration. Shell Mijnbouw has begun site investigations for its \$1.2 billion coal mining investment in Bukit Asam, South Sumatra, which is expected to produce up to 25 million tons of coal annually.

Nine new cement production projects are planned for completion during and after the current national development plan period, which will add over 5 million tons to domestic cement production capacity and make the country self-sufficient in cement.

The planned huge government low cost housing construction program has yet to begin, and a number of major wood processing projects are now being planned. Tender bids for the construction of six new government-owned sugar mills on Java (\$40 to \$50 million each) were being evaluated in 1976, and it is expected that several more sugar mills will be built on other Indonesian islands later. Ports, harbors, and shipping have received some funding but still lack the huge sums required for a distribution system adequate to handle Indonesia's expected future industrial output and general cargo. There is a great lack of materials handling equipment and ware-

housing facilities and the Government has launched major warehouse construction programs. Feasibility studies for a national fertilizer and cement distribution system have also been implemented by the Government. Concessionary financing was being sought in 1976 for a proposed new Jakarta airport.

Imports, rose by 24% in 1975 to \$4,770 million, compared with \$3,842 million in 1974. They were slightly lower in the first half of 1976 than in the first half of 1975. However, they are likely to recover quickly with Indonesia's improving balance of payments prospects.

Imports of consumption goods were down by 5% in 1975 due mainly to reduced rice imports but imports of capital goods were up 37% (see table 5). Fertilizer imports rose sharply. In part, future import composition depends on the Government's success in reducing its dependence on imports of rice, fertilizer, and cement. These were valued at nearly \$800 million in 1975 and comprised some 15% of total imports. Indonesia aims for self-sufficiency in these products and expansion of domestic output is gaining momentum.

The current 5-year development plan, as originally planned envisaged about a 19% annual growth in imports, excluding those associated with oil and natural gas development—from \$2,978 million on FY 1973/74 to \$7,120 million in FY 1978/79. A major change is expected in the composition of imports. By the end of the period, consumption goods

Table 5.—Principal Indonesian Imports, 1974–75
(in millions of US\$)

	1974	1975
Consumption goods	707.0	677.5
Milk and creams	24.0	22.4
Rice and glutinous rice	374.2	326.5
Flours and meal of cereal	16.0	2.5
Pharmaceutical preparations	34.2	32.6
Cotton dyed and colored	1.5	3.3
Sewing machines	2.3	3.5
Other	254.8	286.7
Raw materials and auxiliary goods	1,582.3	1,961.1
Cloves and cloves stalk	14.9	89.3
Chemicals and pharmaceutical products	109.3	119.6
Fertilizer	227.2	401.3
Paper	30.2	23.1
Weaving yarns of cotton	20.8	8.7
Shirting	1.3	.4
Cement	68.3	69.4
Iron and steel in bars	127.9	101.1
Petroleum and products	183.0	253.5
Other	799.4	894.7
Capital goods	1,552.6	2,131.2
Pipes of iron or steel	81.9	223.5
Prime movers	71.4	107.8
Internal combustion engines	31.7	17.5
Machines for industrial and commercial use ..	426.1	528.1
Motor cars	75.5	93.7
Buses and trucks	19.1	27.2
Other	846.9	1,133.4
Total imports	3,841.9	4,769.8

Source: Central Bureau of Statistics.

are expected to comprise 17% of total imports, compared to 32% in FY 1973/74. This will reflect the results of import substitution efforts and economic growth; raw materials and other intermediate products will comprise 34%, slightly higher than the 31% in FY 1973/74; while capital goods will comprise 49% of the total compared to 37% in FY 1973/74.

U.S. Trade With Indonesia.—In 1976, U.S. exports rose by 28% to \$1,036 million (a slower growth rate than the 53% experienced the year before), of which machinery and transport equipment comprised about 60% and agricultural commodities about 20%. U.S. imports from Indonesia in 1976 rose by 35% to \$3,004 million, resulting in a bilateral trade balance of about \$2 billion in Indonesia's favor. By far the largest U.S. import from Indonesia was crude petroleum which comprised 81% of the total. In 1975 Indonesia ranked first as a supplier to the United States for crude rubber; second for spices, tea, and palm oil; third for palm kernel oil; fourth for unwrought tin; and fifth for crude petroleum. (See table 6).

Table 6.—U.S. Trade with Indonesian, 1974–76¹
(in millions of US\$)

	1974	1976
<i>U.S. Exports to Indonesia</i>		
Unmilled wheat	6.5	55.7
Rice	19.7	93.0
Raw cotton	60.0	49.2
Chemicals	93.5	58.7
Fertilizers	51.1	(²)
Iron and steel products	28.1	36.6
Machinery	189.4	436.5
Power generating machinery, excl. electric ..	17.6	41.7
Construction and mining machinery	49.6	60.1
Pumps, centrifuges, etc.	11.7	31.2
Mechanical handling machinery and equipment	10.3	19.8
Electric power machinery, switchgear		
and parts	30.1	96.3
Telecommunications apparatus and parts ...	4.4	67.1
Transport Equipment	47.2	182.8
Road motor vehicles and parts	19.6	18.0
Aircraft, spacecraft, and parts	26.8	119.1
Other	85.4	125.7
Total exports of domestic merchandise	529.8	1,035.2
Total exports including reexports	530.5	1,036.0
<i>U.S. Imports from Indonesia</i>		
Fish and fish preparations	9.3	7.7
Coffee	56.1	105.0
Tea, crude and prepared	12.2	12.5
Pepper and pimento	17.8	22.5
Other spices	11.2	8.7
Rubber, natural and similar natural gum	213.7	238.2
Petroleum, crude and partly refined	1,196.7	2,446.7
Petroleum products	76.3	83.4
Palm oil	24.5	4.5
Palm kernel oil	9.4	3.8
Tin and tin alloys—unwrought	30.3	35.2
Other	30.5	34.1
Total U.S. general imports	1,688.0	3,004.3

¹ Exports are on a f.a.s. basis; Imports are on a customs value basis.

² 1976 total is \$5,000.

Source: U.S. Bureau of the Census.

In 1975, based on Indonesian statistics, the United States supplied 14% of Indonesia's imports and took 26% of its exports.

While the growth of U.S. exports to Indonesia in 1976 has been at a slower pace than in 1975, they should well exceed \$1 billion. Favorable factors for continued growth are the increased competitiveness of many U.S. products, expenditures of U.S. oil companies, and the implementation of U.S. Export-Import Bank (Eximbank) loans. Over the longer period, U.S. export growth will depend heavily on continuing U.S. investment in resource development and the ability of U.S. firms to participate in other major project areas.

SURVEY FINDINGS

Indonesian imports of capital equipment associated with the 14 industrial sectors included in this survey are expected to grow from \$1.6 billion in 1975 to \$3 billion in 1980, an increase of 84%. (See table 7.) During that same period, purchases of capital equipment from U.S. suppliers for the 14 sectors are expected to grow from \$363 million to \$636 million. U.S. suppliers should hold a better than 20% share of these imports through 1980.

SECTOR HIGHLIGHTS

Transportation.—In 1975 Indonesia's total imports of transport equipment were \$597.7 million including \$451.5 million of road transport equipment, \$84 million of air transport equipment, \$55.6 million of marine transport equipment and \$6.6 million of rail transport equipment.

Sales of road vehicles are increasing each year as Indonesia's highway building program forges ahead and as local assemblers increase their production of vehicles from imported parts. While the major multinational manufacturers are well established in the assembly industry, there will be a continuing demand for imported trucks and specialized vehicles. This will provide opportunities for smaller and specialized U.S. manufacturers. Also, the market for motor vehicle parts and maintenance equipment is increasing.

The Government-owned railway system in Indonesia is undergoing rehabilitation with World Bank and other international assistance funds. The program includes purchase of a substantial number of locomotives, passenger, and freight rail cars as well as other railroad equipment.

Government plans for marine fleet expansion during the current national plan call for an increase in capacity for the oceangoing fleet from 278,276 DWT

Table 7.—Indonesia: Capital Equipment Imports ¹
(in millions of US\$)

	Total			From U.S.			U.S. Supplier Import Market Share	
	1975	1980	% Change	1975	1980	% Change	1975	1980
Transportation Equipment	597.7	1,265.6	+ 112	73.3	198.9	+ 171	12	16
Construction Equipment and Building Materials	246.9	378.0	+ 53	94.9	157.4	+ 66	38	42
Mining, Petroleum, and Natural Gas Extraction Equipment	162.6	312.4	+ 92	51.9	97.1	+ 87	32	31
Textile and Wearing Apparel Production Equipment	137.1	265.7	+ 94	4.5	13.2	+ 193	4	5
Electric Power Equipment	162.8	211.0	+ 30	42.5	48.8	+ 14	25	23
Telecommunications Equipment	130.4	135.7	+ 4	54.7	30.0	- 45	42	22
Chemical Industries Equipment	49.8	110.5	+ 122	15.2	35.4	+ 132	30	32
Food Processing and Packaging Equipment	41.6	80.7	+ 94	7.5	9.2	+ 23	18	11
Metallurgical and Metalworking Industries Equipment	46.4	110.9	+ 139	6.4	14.8	+ 131	14	13
Business Equipment and Systems	23.6	54.4	+ 130	5.1	10.0	+ 96	22	18
Forest Resources Production Equipment ..	18.5	59.7	+ 222	1.0	6.0	+ 500	5	10
Medical and Health Services Equipment	9.7	26.7	+ 175	2.5	9.5	+ 280	25	36
Printing and Publishing Equipment	8.6	19.9	+ 131	1.7	1.9	+ 12	20	10
Agricultural Equipment	7.9	17.4	+ 120	1.8	3.8	+ 111	23	22
	1,643.6	3,048.6	+ 85	363.0	636.0	+ 75	22	21

¹ Reported in "Government, Business and Financial Establishments."

Source: Based on Official Indonesian and supplier statistics, and estimates based on trade interviews.

to 541,409 DWT. In addition, increases in inter-island merchant fleet tonnages are projected. Both new and used ships will be purchased to achieve these targets. Port expansion and rehabilitation plans will require additional cargo handling equipment such as cranes and forklift trucks as well as provide opportunities for sale of engineering, management, and other consulting and professional services.

Domestic air travel has shown rapid progress in recent years as a result of expanded flight networks, higher flight frequencies, and general improvement of facilities and infrastructure. Development plans call for acquisition of additional aircraft and improvement of airport facilities. The international fleet of Garuda, the major Indonesian airline is being expanded, while plans for initiation of international charter flights by other domestic airlines are being implemented. Growing general aviation activity creates opportunities for sale of light aircraft.

Construction and Public Works.—Construction activity in Indonesia is growing at a faster rate than the gross domestic product. Although domestic production of building materials is increasing, Indonesia will continue to require imported products. Good market opportunities exist for a wide range of construction equipment including: Track tractors, bulldozers, wheel loaders, large dump trucks, road building and repairing equipment, cutter dredges, hydraulic excavators, mobile cranes, asphalt and aggregate mixing plants, builders hardware, and central air-conditioning equipment.

Mining, Petroleum, and Natural Gas Extraction.—

After a serious slump in both world market prices and domestic production in the mid-1970's the industry is beginning to recuperate. Exploration activities to discover the full extent of Indonesia's mineral resources are now underway and mining activities are being modernized and rationalized. Of particular significance is the planned expansion of coal, nickel, and copper mining. Equipment items with high sales potential include: Offshore dredges, geological survey and testing equipment, wheel loaders, and off-road trucks.

Indonesia's petroleum industry is the country's major export earner, although during 1975 and 1976 there was a slowdown in activities by foreign exploration firms (mostly U.S.) as a result of the Indonesian Government's decision to change the terms of contracts with those firms. The industry will require continuing supplies of equipment and materials, as well as specialized technical and support services. Of high potential are: Specialized pumps, drilling rigs instrumentation, and pipeline equipment. Between 1975 and 1980 imports of mining and petroleum equipment are expected to increase by 92% from \$162.6 million to \$312.4 million.

Electric Power.—Indonesian electric power demands have outstripped supply so that the Government-owned electric power utility has not been able to meet the demand. The result has been continuing purchases of power plant equipment in various sectors of the economy. Nearly every significant industrial, commercial, and infrastructure installation in the country has its own captive power source. As of

1976 total generating capacity in Indonesia was an estimated 3,823 megawatts of which about 55% was from captive sources.

Expansion plans are substantial. The Perusahaan Umum Listrik Negara (the State Electricity Corporation—PLN) plans a number of new installations, while many new private sector installations are also planned. Generating capacity is projected to reach 4,454 megawatts in 1980.

Good market opportunities exist for fossil fuel steam generating plants, diesel generator sets of all size ranges, gas turbines, hydroelectric power plants, and transmission and distribution equipment. While the major multinational manufacturers are actively pursuing business with PLN, the extensive captive power market offers excellent opportunities for smaller U.S. manufacturers of generator sets. Foreign consultants are required by the PLN for planning and construction supervision of various projects.

Imports of electric power equipment by PLN and captive power producers between 1975 and 1980 are projected to increase by 30%, from \$162.8 million to \$211 million.

Chemical Industries.—Indonesia's fertilizer and cement production have developed rapidly in recent years, and expansion in these sectors continues, with major plants under construction or planned. However, most significant is Indonesia's projected expansion into major petrochemical production. Although plans and financing are not fixed for two major petrochemical complexes planned in Sumatra, they promise excellent business opportunities related to the construction of the complexes themselves, as well as the later development they will stimulate. In addition to these major projects, there are a number of smaller projects for production of agricultural chemicals such as pesticides and herbicides and in such areas as pharmaceutical production which will provide continuing opportunities for chemical equipment sales.

Good market opportunities exist for such equipment as: Gas turbines, high pressure piping, high pressure valves and fittings, compressors, chemical and process pumps, process control instruments, and various types of reaction vessels. Among the greatest opportunities in the sector will be sales of technology and design, purchasing, and construction services. The key position of leading U.S. engineering firms as prime contractors for major projects provides excellent opportunities for smaller, specialized U.S. manufacturers to sell their products. Chemical processing equipment imports are expected to grow by 122% between 1975 and 1980 from \$49.8 million to \$110.5 million.

Forest Resources Production.—Indonesia possesses the richest forest resource of any country in

Southeast Asia. Next to petroleum and natural gas, forest product exports have become Indonesia's second largest source of foreign exchange earnings. Through the end of 1975, a total of 284 forest exploitation licenses had been issued by the Directorate-General of Forestry. More than 128 firms operate various types of wood processing industries, including sawmills and plywood factories.

Although Indonesia has such large reserves of timber, the country is not self-sufficient in paper. There are a number of projects under development for establishment of integrated pulp and paper operations.

High sales potential items for logging include: Tractors, skidders, loaders, and chainsaws. For wood processing the best opportunities are for sales of turnkey sawmills and plywood factories. There are also requirements for portable sawmills, lathes and sanders for plywood factories, and drying kilns. There will also be a need for papermaking equipment to upgrade existing mills, and large scale projects under consideration could stimulate sales of both equipment and professional services.

Total sales of logging and saw milling equipment between 1975 and 1980 are expected to increase by 126% from \$13.5 million to \$30.6 million. This does not include the substantial amounts of heavy equipment used for road building and other construction work in timber harvesting.

Printing and Publishing.—The printing and publishing industry in Indonesia is experiencing rapid growth. The Government's emphasis on increasing literacy, doubling of school enrollment, and increases in per capita income have all contributed to rising book, magazine, and newspaper sales. The growth in processed food output, as well as growth in other production requiring packaging has resulted in demand for more packaging materials. Commercial printing needs such as those for business forms and for advertising have also increased rapidly in recent years.

The growing printing for packaging segment of the industry will require both pressroom units as well as prepress graphic equipment in increasing quantities. Textbook production is another very rapidly expanding field which will require gluing and stitching or stapling machines, in addition to more efficient folding and collating equipment. Other equipment required in the industry includes: Computerized typesetters, materials handling equipment such as small forklift trucks, and shipping room equipment such as wrapping and tying machines.

Printing and graphic arts equipment sales between 1975 and 1980 are expected to increase by 131% from \$8.6 million to \$19.9 million. This is not a market dominated by major multinational suppliers,

and there are growing sales opportunities for the many smaller specialized U.S. manufacturers.

Agro-Industry.—Agriculture is the mainstay of the majority of Indonesia's population. The majority of rice and most other food crops are produced by heavily labor intensive methods on small-holder plots, although there is a substantial portion of agricultural production by large commercial plantations. These are concentrated in rubber, palm oil, coffee, tobacco, sugar, and tea production. It is from the plantations that the greatest opportunities for equipment sales will come in the near future.

High potential items include: Land preparation equipment such as large tractors, and fertilizer and pesticide distribution equipment. Processing equipment is also required for sugar, palm oil, and rubber. Projected production growth will also require storage facilities and materials handling storage equipment. Agricultural equipment sales between 1975 and 1980 are expected to increase by 120% from \$7.9 million to \$17.4 million.

MARKETING FACTORS

American exporters should be prepared for delays at Indonesian ports of entry and approaches from middlemen offering to ensure quick completion of paperwork enabling clearance of goods. Although there are few restrictions on goods which may be imported into Indonesia, the import duties are high in several instances. There are a number of surcharges, extra levies, and exemptions which make the system very complicated and subject to individual interpretation by the customs officials. Shipments require as many as 80 individual signatures from various officials before the goods can be taken out of Tanjung Priok Harbor in Jakarta.

Illegal entry of goods is a problem which the Government is attempting to eliminate. In its efforts to ensure more complete collection of import tax revenues, an antismuggling campaign was inaugurated by the Government in 1976. Since illegally imported goods are not included in the official trade statistics, estimates have been made to include them in the industrial reports of this survey. For this reason the value of imports reported in the survey may not agree with official sources.

The largest customer for capital goods and services in Indonesia is the Government. The reasons for this are its development programs involving infrastructure expansion, ownership and control of many industrial activities, and the channeling of considerable foreign aid through the Government. Government procurement therefore plays a significant role in import patterns and procedures. Another important marketing factor is that importing and distribu-

tion are restricted by regulation to Indonesian nationals. Americans doing business in Indonesia should be prepared for such frustrations as delays in obtaining licenses from the Government, limited telephone and telex service as well as other communication difficulties, poor transportation facilities and delays in customs clearance of imported goods. Regional and provincial officials tend to interpret central Government regulations differently. Also, Indonesian business firms often tend to not treat contracts as fixed. To quote one experienced foreign businessman, "In Indonesia, when a contract is signed is when negotiations begin." No matter what agreements are made in Jakarta, implementation and interpretation at the local level are often the more critical factors.

The Indonesian penchant for flexibility and consensus is important in understanding the country. Indonesians normally talk out their differences until a consensus is reached, a process called *musyawarah*. Although a firm policy, rule, or law may be issued, it is not always clear cut or rigid in application. The ability and willingness to compromise is a mixed blessing. It sometimes results in creative flexibility and other times causes an obfuscation of policies and uncertainty.

U.S. suppliers are not taking full advantage of market opportunities in Indonesia. There is agreement among knowledgeable industry sources that U.S. products could find a wider market if more efforts were placed on market promotion and development. In expanding sales, U.S. manufacturers face aggressive competition from other foreign suppliers who are more active in Indonesia, more familiar with the market, and frequently more willing to provide better credit and delivery terms.

Perhaps more than any other factor, credit is decisive in successful sales in Indonesia. One leading agent put it succinctly when he said: "It you want to sell in Indonesia, bring the money with you." Domestic interest rates are high. A 24% annual interest rate is not unusual for normal business dealings. When an Indonesian firm opens a letter of credit the loss to him on his deposit ranges from 1% to 2% per month. A 3-month delivery time from the United States, plus another month for port clearance adds 4% to 8% to his cost. U.S. products with the same c.i.f. price as competitive Japanese goods often cost more in Jakarta based on time, distance, and interest factors. U.S. firms should therefore consider total costs to the buyer in Indonesia. They should arrange attractive credit terms by drawing on U.S. domestic or offshore sources available to them at lower interest rates, in order to offset the price and delivery time advantages enjoyed by major foreign competitors. U.S. companies should develop the capability in Indonesia to evaluate credit standing

on the spot and negotiate more favorable terms. In order to relieve their representatives of heavy charges on letter of credit interest, some American firms have been making effective use of bonded warehouse facilities.

A great number of trade credits originate in Hong Kong and Singapore because of long-standing business connections and family ties. There has been a concerted effort on the part of the Indonesian Government to strengthen the role of ethnic Indonesians in private trade, but ethnic Chinese Indonesians still manage a substantial portion and will probably continue to do so in the future. Indonesian Chinese are often able to import goods and incur minimal interest costs by obtaining suppliers credits from Singapore and Hong Kong business relations, frequently through family channels.

Singapore's port has excellent facilities, and import barriers and duties are minimal. In addition, Singapore is very attractive as a transshipment point. Singapore's geographical location is more convenient than Tanjung Priok to many parts of Sumatra and Kalimantan. Shippers often find that they are able to ship from Singapore to many parts of Indonesia at a lower cost than from Jakarta. Also, the frequency and reliability of service from Singapore is often better than from Indonesian ports. Some Indonesian agents and distributors have established their own offices and warehouses in Singapore solely for the distribution of goods to Indonesia. Due to recent increases in storage charges in Singapore several firms have reestablished their facilities in Hong Kong.

The vital importance of visiting Indonesia and understanding local circumstances cannot be overemphasized. American businessmen should be on the scene to understand the difficulties and opportunities in the Indonesian market. U.S. suppliers should establish dependable permanent representation in Indonesia, including ample stocks of equipment and spare parts, and trained personnel.

Firms new to Indonesia should take adequate time to locate and develop representation, work out detailed arrangements, and set up a good working arrangement. They should be prepared for a slow start of 6 to 12 months before operations are underway. They may have to be prepared to make substantial investment of funds, time, and training to develop a relatively inexperienced firm into an effective rep-

resentative; such an approach has been rewarding in many cases.

Strong local representation is also very important because customers feel agents in Indonesia increase the chances of adequate service and training assistance—two factors that are vital in making sales. Training of sales personnel and end users in the use and maintenance of equipment being sold is essential. A supplier who maintains a stock of spare parts locally and/or in Singapore or Hong Kong, will have a strong selling point.

Tea Money.—The practice of paying a gratuity before, rather than after a service is performed goes by several names in many different countries. In its most basic form "ouang teh"—tea money—may help expedite official procedures. In its more complicated form, buyers' commissions or rebates may be suggested for making substantial purchases. Opinions vary widely among companies operating in Indonesia as to how pervasive the practice is and whether it is necessary to conform. Many firms which have done successful business in Indonesia for years do not pay any "ouang teh." Others claim that business would come to a standstill without it.

Although "ouang teh" or more complicated forms of payment may occasionally offer a shortcut, successful business without them is possible. Many successful foreign firms operating in Indonesia recommend that building a reputation for honesty and straightforward business practices is the best policy in the long term.

The Indonesian Government has publicly condemned the practice and has discharged officials alleged to have been corrupt. Whether and to what extent such payments will be arrested remains to be seen.

An experienced observer of Indonesian affairs, who has had long experience in Indonesia as a senior government representative and as a private businessman, expressed the opinion that there were great potential rewards for business in Indonesia. However, he added that the businessman is faced with many frustrations, and that business in Indonesia is not for the weak-kneed and impatient. It takes a long term commitment, a high degree of fortitude and persistence to be successful. Businessmen without those qualities will fall by the wayside, but there are many success stories among those with imagination, patience, and a pioneer spirit.

Agro-Industry

Indonesian agro-industry has considerable potential for future development. Formerly an important exporter of agricultural commodities, Indonesian agriculture is now struggling to recover from years of devastation, neglect, and often poor management. Habits and patterns formed during those years continue to plague the industry today.

Government programs under the first National Development plan (Repelita I, 1969/70–1973/74) were focused on the rehabilitation and expansion of the commercially oriented estates. Considerable progress was made in revitalizing both crop production and management methods. However, a rising population, government budgetary shortages related to the financial problem of the national petroleum corporation, and a serious drought cut into some of the hard-earned gains.

The second national development plan (Repelita II, 1974/75–1978/79) calls for intensification of estate improvement, including increased processing and research into new crop strains. Programs are also being directed toward improving the situation of the smallholder. Plans for individual assistance include seed and fertilizer distribution, credit availability, and a wide variety of both formal and informal educational opportunities. Several international organizations are assisting projects directed toward agricultural improvement.

Total sales of agricultural and related equipment in 1976 are estimated at more than \$10 million. New programs and continued expansion are expected to result in an average annual increase of over 14%, and the market for agricultural equipment is expected to reach in excess of \$17 million by 1980.

Many opportunities for equipment sales exist in the Indonesian agricultural industry, but competition from long-established firms is keen. There is a great need for agricultural training and technical assistance; equipment suppliers who tailor their marketing approach toward meeting these needs will be successful in developing sales. Equally important from a long-range perspective, firms who offer such assistance will build relationships leading to future equipment sales.

STRUCTURE AND SIZE

Agriculture is an integral part of nearly every facet of Indonesia's economic life although much of its activity is not part of the cash economy. It is estimated that in 1975, agricultural production contributed 40% to the value of gross domestic product (GDP), a share which has dropped steadily from the 54% in 1960, contributed by agriculture. Agriculture employed 27 million people in 1975 which represented 64% of the total labor force. In addition, uncounted millions worked on subsistence level family farm plots.

Since 1970, production of both food and commercial crops has increased considerably (see table 1). Gross export earnings from major agricultural commodities totaled \$799.5 million in 1975, and accounted for 11.3% of total export earnings (see table 2). Imports of agricultural and food products were valued at \$601.2 million in 1975.

Of the nation's 470 million acres (190 million hectares), approximately one-third are suitable for agricultural development, but in the mid-1970's only 44 million acres was under cultivation. While considerable quantities of unexploited agricultural land is available in southern Sumatra, Sulawesi, and eastern Kalimantan, nearly all arable land in Java, Madura, and Bali is currently being cultivated.

Producers

Indonesian agriculture is made up of 1,800 large estates and about 14 million smallholders and family plots. Estates account for 13% of land presently under cultivation. They average 1,200 hectares and vary from labor-intensive through many levels of mechanization. The majority of estates are located on the outer islands (Sumatra, Kalimantan and Sulawesi). Government-owned estates are the largest production units in commercial agriculture, although there are several foreign ventures, and over 800 other private estates under a variety of ownership arrangements. The great majority of government-owned estates were seized from Dutch and other foreign owners and nationalized during the 1950's and early 1960's.

Table 1.—Indonesia: Production of Major Agricultural Commodities

	1970	1971	1972	1973	1974	1975	1976	1980
Food Crops (1,000 tons)								
Rice (Unmilled) ¹	25,269	26,392	25,587	28,273	29,715	29,506	31,188	38,930
(Irrigated)	(23,148)	(24,308)	(23,630)	(26,225)	(27,871)	(27,676)	(29,254)	(36,516)
(Nonirrigated)	(2,121)	(2,084)	(1,975)	(2,048)	(1,844)	(1,830)	(1,934)	(2,414)
Corn	2,825	2,600	2,254	3,690	3,240	3,066	3,200	4,150
Cassava	10,451	10,042	10,030	11,400	13,775	12,900	13,319	15,262
Sweet potatoes	3,029	2,153	2,147	2,386	2,916	3,000	2,657	2,655
Soybeans	488	516	518	541	550	518	579	656
Peanuts	281	284	282	290	293	295	299	311
Total Food Crops	42,343	41,987	40,818	46,580	50,840	49,590	51,551	62,288
Commercial Crops (1,000 tons)								
Rubber	811	804	885	950	943	968	995	1,200
Palm Kernels	48	56	59	64	73	80	85	118
Palm Oil	214	248	269	275	349	403	440	475
Copra	1,167	1,277	1,254	1,280	1,357	1,656	1,700	1,920
Sugarcane ²	9,785	10,448	10,720	11,000	11,967	13,834	15,368	17,656
Coffee	185	191	188	193	197	228	264	325
Tea	67	71	74	76	77	67	74	107.9
Spices	28	29.2	31.5	73.6	83.2	103.2	127.9	302.5
Tobacco	72	78	75	77	67	84	90	107
Total Commercial Crops	12,377.0	13,202.2	13,555.5	13,988.6	15,862	17,423.2	18,747.9	22,211.4
Livestock (1,000 head)								
Cows	6,130	6,243	6,354	6,682	6,500	6,246	6,400	7,779
Buffalo	2,976	2,916	2,898	2,870	2,900	2,807	2,800	3,403
Goats	6,336	6,943	7,354	7,468	6,900	6,617	6,500	7,900
Sheep	3,362	3,146	3,001	3,207	3,500	3,356	3,600	4,375
Pigs	3,169	3,382	3,350	3,218	3,800	3,850	3,900	4,740
Horses	692	665	680	689	690	675	695	782
Total Livestock Population	22,665	23,295	23,637	24,134	24,290	23,551	23,895	28,979
Poultry (birds)								
Chickens	n.a.	n.a.	n.a.	99,769	109,679	115,163	120,921	146,980
Ducks	n.a.	n.a.	n.a.	13,810	15,879	16,355	16,846	18,960
Total Poultry Population	n.a.	n.a.	n.a.	113,579	125,558	131,518	137,767	165,940
Eggs (1000)								
Chicken	965.8	1,129.0	1,013.6	1,640.9	2,128.3	2,698.5	3,518.7	8,005.2
Duck	315.6	334.3	356.5	381.5	410.1	441.2	478.7	660.6
Other	37.6	39.8	42.4	45.4	48.6	52.2	56.1	74.0
Total Egg Production	1,319.0	1,503.1	1,412.5	2,067.8	2,587.0	3,191.9	4,053.5	8,739.8
Milk (1,000 liters)								
	29.3	36.0	37.7	39.6	41.3	42.8	44.7	50.6

¹ Milled weight is approximately $\frac{1}{2}$ of unmilled figures.

² In Indonesia refined sugar production is approximately 8% of sugarcane figures.

Sources: Central Bureau of Statistics, Department of Agriculture, Directorate-General of Estates, U.S. Embassy, Jakarta.

Table 2.—Indonesia: Agricultural Export Earnings, 1974 and 1975

(in millions of U.S. dollars)

Commodity	1974	1975	% of Change
Rubber	487.3	350.0	—28
Palm Kernels	8.4	5.0	—40
Palm Oil	166.0	150.6	—9
Copra	n.a.	2.1	—
Copra Cake	23.2	25.0	8
Tapioca Products	24.0	7.1	—70
Coffee	101.3	95.1	—6
Tea	43.6	50.4	16
Pepper	24.6	20.2	—18
Nutmeg and Mace	2.5	4.7	88
Other Spices	6.1	3.7	—39
Other Foodstuffs	49.7	38.0	—24
Tobacco	35.5	37.7	6
Animal Hides	10.0	9.9	—1
Total Agricultural Export Earnings	982.2	799.5	—19
Total Export Earnings	7,426.3	7,103.5	—13

Source: Bank Indonesia.

The vast majority of land in Indonesia is cultivated by smallholders on plots which average one hectare in size. Most of the farming on Java, Madura, and Bali is done by highly labor-intensive methods.

In 1974, commercial crops were cultivated on 851,000 hectares of estate land, and 5,124,200 hectares of smallholder's land. Although estates accounted for only 14% of commercial crop land they produced 41% of all commercial agricultural commodities (see table 3). Estates recorded higher yields per hectare in all types of production. For example, in rubber production, estates held 19% of the land and produced 30% of total output; in sugarcane, estates accounted for 60% of land but 80% of the production, and in tobacco production, the 1.4% of estate held land yielded 12% of the nation's tobacco. Sumatra has the largest area under estate cultivation, over 1 million hectares.

Table 3.—Indonesia: Commercial Crop Production, Smallholders and Estates,¹ 1970–74
(in thousands of tons)

Crop	1970		1971		1972		1973		1974	
	Smallholder	Estate	Smallholder	Estate	Smallholder	Estate	Smallholder	Estate	Smallholder	Estate
Rubber	571.0	238.2	547.0	238.7	567.3	236.3	597.9	246.5	589.9	248.7
Oil Palm	—	265.0	—	304.5	—	328.6	—	354.1	—	425.3
Coconut	1,198.9	8.8	1,273.9	8.9	1,248.7	10.1	1,274.4	12.5	1,352.5	13.0
Sugarcane	195.8	713.3	218.7	834.0	213.9	889.3	203.7	819.8	254.4	1,024.8
Coffee	170.1	16.2	162.0	19.4	158.1	22.4	140.3	10.1	144.3	16.2
Tea	20.6	42.9	14.5	47.5	11.9	48.3	14.3	53.1	14.9	50.1
Spices	48.0	nil	48.5	nil	62.2	nil	73.7	nil	60.2	nil
Tobacco	68.3	6.1	48.3	7.9	116.0	8.4	67.2	8.4	67.9	9.0
Miscellaneous	77.9	8.3	109.3	5.1	86.2	3.2	108.3	2.5	122.0	4.1
Totals	2,350.6	1,298.8	2,442.2	1,466.0	2,464.3	1,546.6	2,479.8	1,507.0	2,606.1	1,791.2

¹ Figures may vary somewhat from total production figures elsewhere since the output of some individual farmers is not registered as smallholder production.

Sources: Central Bureau of Statistics, Directorate-General of Estates.

Estates and other Agro-Industry Enterprises.—Perusahaan Negara Perkebunan, (PNP) is the designation for government-owned plantations operated under control of the Department of Agriculture and funded by the national budget. In 1976 there were 10 with a total area of 200,016 hectares (see table 4). Production included the full range of commercial crops such as palm oil, rubber, coffee, tea, coconut, tobacco, sugar, and spices.

The PNP's were formed in 1968 under Government Regulation No. 14. At that time 28 estate corporations were organized, each of which integrated several formerly separate plantations. In 1972, two additional PNP's were formed as well as the government-owned corporate cotton estates, Perum Kapas.

Although total income increased from \$93.9 million in 1968 to \$248 million in 1972, many of the

Table 4.—Indonesian: Agro-Industry—Principal Producers, 1976

Firm	Production	Remarks
PNP		
PNP I	Palm Oil, Rubber, Coffee	14 plantation units
J1. Cendrawasih No. 86, Langsa, Aceh		35,000 ha
PNP II	Rubber, Palm Oil, Cacao	13 plantation units
Tanjung Morawa, North Sumatra		33,017 ha
PNP VI	Palm Oil, Rubber, Cacao	8 plantation units
Pebatu Tebing Tinggi, North Sumatra		32,957 ha
PNP VII	Palm Oil, Rubber	12 plantation units
Pematang Siantar, North Sumatra		42,603 ha
PNP XI	Rubber, Tea, Cinchona, Coconut	26 plantation units
J1. Pecenongan #40, Jakarta		21,344 ha
PNP XIV	Sugar	7 sugar factories
J1. Dr. Wajodom Soedirohusodo 48, Cirebon, West Java		7,667 ha, lease
PNP XVI	Sugar	6 sugar factories
J1. Ronggowarsito #164, Surakarta, Central Java		7,865 ha, lease
PNP XIX	Tobacco	14 units
J1. Slamet, Rijadi #272, Surakarta, Central Java		4,220 ha, lease
PNP XX	Sugar	6 sugar factories
J1. Merak #1, Surabaya, East Java		7,659 ha
PNP XXVIII	Rubber, Cacao, Coconut, Spices	4 regions
J1. L. B. Martadinata #42/44, Ujung Pandang, South Sulawesi		7,684 ha
PTP		
PTP III	Rubber, Palm Oil	9 plantation units
Sei Sikambing, Medan, North Sumatra		21,310 ha
PTP IV	Rubber	24 plantation units
Genung Unung Pamela, Tebing-Tinggi, North Sumatra		29,802 ha
PTP V	Rubber, Palm Oil	12 plantation units
Seikarang, Galang, Sei Sikambing, North Sumatra		26,879 ha
PTP VIII	Tea, Cacao	9 plantation units
J1. Pemuda No. 10A, Medan, North Sumatra		14,472 ha
PTP IX	Tobacco, Palm Oil	23 plantation units
J1. Temkakan Deli #4, Medan, North Sumatra		9,562 ha
PTP X	Rubber, Palm Oil, Tea	14 plantation units
Tromol Pos #74, Tanjung Karang, Lampung		12,694 ha

Table 4.—Indonesia: Agro-Industry—Principal Producers, 1976—Continued

Firm	Production	Remarks
PTP XII Jl. Cikapundung Barat #1, Bandung, West Java	Rubber, Tea, Cinchona, Others	25 plantation units 21,344 ha
PTP XIII Jl. Ir. Juanda #99, Bandung, West Java	Rubber, Tea, Cinchona, Coffee, Coconut	21 plantation units 17,728 ha
PTP XV Jl. Mpu Tantular #4-5, Semarang, Central Java	Sugar	8 sugar factories 9,284 ha, lease
PTP XVII Semarang, Central Java	Roselia, Jute	3 sugar bag factories 6,672 ha
PTP XVIII Jl. Suari #10-12, Semarang, Central Java	Rubber, Tea, Cinchona	29 plantation units 33,334 ha
PTP XXI and XXII Surabaya, East Java	Sugar	12 sugar factories 22,945 ha
PTP XXIII Jl. Rajawali, Surabaya, East Java	Rubber, Tea, Cinchona, Coffee, Cacao, others	17 plantation units 27,752 ha
PTP XXIV and XXV Jl. Merak #1, Surabaya, East Java	Merger—Sugar	12 sugar factories 18,427 owned land & lease
PTP XXVI Jl. Iman Bonjol #3, Jember, East Java	Rubber, Tea, Coffee, Cacao, others	19 plantation units 22,381 ha
PTP XXVII Jl. Iman Bonjol #14i, Jember, East Java	Tobacco	17 plantation units 4,841 ha
PTP XXIX Surabaya, East Java	Rubber, Coffee, others	12 plantation units 11,000 ha
PTP XXX Surabaya, East Java	Rubber	9 plantation units 13,500 ha
Perum Kapas Surabaya, East Java	Cotton	9 plantation units 7,100 ha
Private Estates and Agricultural Business Enterprises		
P.T. Untung Setia Ltd. Jl. Kartini 14, Tanjung, Karang, Lampung	Corn & Cassava	5,000 ha
C.V. Progressive Jl. Pos Sudarso, Teluk Betung, Lampung	Corn & Cassava	5,000 ha
C.V. Daya Karya Jl. Sarenarua 404, Teluk Betung, Lampung	Corn	2,982 ha
P.T. Sinar Labuhar Jaya C.P.T. Silajaya, Jl. Yos Sardarso, Sukaraja, Teluk Betung, Lampung	Cassava	6,570 ha
P.T. Patri Kamon Jl. Iskandar Muda, 85, Langsa, Aceh	Rubber	3,500 ha
P.T. Perush. Perk. Industrl. Danang Umum (P.T. Umada), Jl. Gatot Subroto 240 D., Medan, North Sumatra	Rubber	2,050 ha
P.T. Telugasarl Indah Jl. Jen A. Yani 55-57, Medan, North Sumatra	Rubber	4,445 ha Estate in Aceh
Perk. Pinang Serl Pemd Sumut d/a Kantar Bupati, Tapanuli, Tengah, North Sumatra	Rubber	2,128 ha
P.T. P.P. LON. Sumatra Indonesia, Jl. Senopati No. 41, P.O. Box 75/KBT, Kebayoran-Baru, Jakarta	Rubber	7,086 ha Estates in South Sulawesi
P.T. Socindo Jl. Yos Sudarso, P.O. Box 254, Medan, North Sumatra	Palm Oil & Rubber	52,000 ha Ownership France Estates in North Sumatra and Aceh
P.T. Hapinis & N.V. Oriental Jl. A. Yani 103, Medan, North Sumatra	Palm Oil & Rubber	14,145 ha
P.T. P.P. London Sumatra Indonesia, Jl. A. yani 2, Medan, North Sumatra	Rubber & Palm Oil	25,000 ha
P.T. Karko Kultura Utama-Perk. Way Ratai, Kotak Pos No. 2, Teluk Betung, Lampung	Rubber & Coffee	10,673 ha
PD. & I. Marlson N.V. Jl. Kamina No. 2, Surabaya, East Java	Sugar Cane	9,000 ha Estate in South Sulawesi
Madikisma P.O. Box 49, Yogyakarta	Sugar	1,891 ha
N.V. Imaco Jalan Undakan Kulon, 57-59, Surabaya, East Java	Sugar	2,550 ha Estate in Madiun
P.T. P.G. Candi Jalan Jen Basuki Rachmat 94, Surabaya, East Java	Sugar	1,126 ha Estate in Sidorejo
P.T. P.G. Kebon Agung P.O. Box 128, Malang, East Java Jalan Asemka 18, Jakarta	Sugar	996 ha Estate in Malang, East Java
P.T. Rajalvali Nusantara P.T. Poltaks Motor RTO Jl. Pemuda 16, Medan, North Sumatra	Coffee	4,000 ha
P.T. Siba Makmur Jl. Butung No. 118, Ujung Pandang, South Sulawesi	Coffee	6,000 ha

Table 4.—Indonesia: Agro-Industry—Principal Producers, 1976—Continued

Firm	Production	Remarks
P.T. Guna Jaya P.O. Box 52, Jl. Tongkol 76, Teluk Betung, Lampung	Rosella	5,000 ha
P.T. Padang Ratu Agricultural Corp., Jl. Brantas 11/6 Kotak Pos 18, Tanjung Karang, Lampung	Rosella	10,100 ha
N.V. Goodyear Sumatra Plantations, Co., Ltd., Medan, North Sumatra	Centrifuged latex, crumb rubber sole crepe, ribbed-smoked sheets	Ownership U.S.A. estate in Dolok Merangin
P.T. Uniroyal Sumatra Plantations Co., Ltd., Kisaran, North Sumatra	Rubber	Ownership U.S.A.
P.T. Palembang Rice Estate Palembang, South Sumatra	Rice	Owned by Pertamina operated by Brewer Pacific Agronomics (of U.S.A.) Agricultural planning and development, agricultural manage- ment, consulting and advisory services
P.T. Cargill Indonesia Kebayoran Baru, Jakarta	Feed manufacturing and poultry breeding. (Selling feed and day old chicks)	Ownership U.S.A. Investment .5 million
P.T. United Livestock South Sulawesi	Beef production	Ownership U.S.A.
Delgetti Co. Pari Pari, South Sulawesi	Cattle	Ownership Australia Investment .5 million
Mitsui Co. Lampung/Sulawesi	Corn	5,000 ha Ownership Japan/Indonesian Military
Virginia International Corp. Bogor, West Java/Palembang, South Sumatra	Cattle	Ownership U.S. Several Ranches
<i>Investment</i>		
P.T. Manggis Sukabumi, West Java	Poultry Breeding	\$.5 million
P.T. Timlico Timor	Beef Cattle Project, Canning	\$1.9 million
P.T. Charoen Pokphand Farm Tangerang, West Java	Poultry Breeding	\$.4 million
P.T. Ankie Enterprise East Java	Poultry Breeding	\$.3 million
P.T. Prigel Sukabumi, West Java	Poultry Breeding	\$.25 million
P.T. Jolnis Cipete, West Java	Poultry Breeding	\$.32 million
P.T. Charoen Pockphand Ind. Animal Feedmill, Ancol, Jakarta	Poultry Breeding, Feed Mill	\$2 million
P.T. Bina Satwa West Java	Feed Mill	\$3 million
P.T. Kartika Yusman Cengkareng, West Java	Poultry Breeding & Production	\$.36 million
P.T. Gipendawa Farm Tangerang, West Java	Poultry Breeding	\$1.92 million
P.T. Kemboken Putra Cibinong, West Java	Eggs & broiler production	\$.24 million
P.T. Nurani Poultry I Cilandak, Jakarta	Egg & broiler production	\$.36 million
P.T. Dias Tun Jang Jaya Jl. Kedung Gedeh, Bekasi, West Java	Poultry & Hog Breeding	\$.72 million
P.T. Indopoca Cibinong, West Java	Poultry breeding and feed production	\$1.9 million
P.T. Hidon Ciawi, Bogor, West Java	Poultry Breeding Farm	\$.36 million
P.T. Peternakan Medan Jaya Jl. Binjai, Medan, North Sumatra	Poultry Breeding & production	\$.24 million
P.T. Karya Abadi Tegal, Central Java	Hog Breeding	\$.1 million
P.T. Cimere Baya Desa Cimere, Kec., Sawangan, West Java	Breeding & Poultry production	\$.3 million
P.T. Proteina Unggas Cimanggis, West Java	Broiler production	\$.17 million
P.T. Peternakan Ayam Cicurug Sukabumi, West Java	Egg production	\$.07 million
P.T. Kanda's Ranch Cirebon, West Java	Cattle, hog & poultry breeding	\$1.66 million
P.T. Murni Rahayu Lembang, Bandung, West Java	Chicken production	\$.3 million

Table 4.—Indonesia: Agro-Industry—Principal Producers, 1976—Continued

Firm	Production	Remarks
		Investment
P.T. Panterman Indah Batu, Malang, East Java	Chicken production	\$.3 million
P.T. Pet. Anu Gerah Pelita Mojokerto, East Java	Chicken production	\$.3 million
P.T. Bina Ternak Ciawi, West Java	Chicken production	\$.15 million
P.T. Disato Raya Ungaran, Central Java	Hog breeding	\$.14 million
P.T. Red Rock Lembang, Bandung, West Java	Chicken production	\$.36 million
P.T. Nurani Poultry II Tangerang, West Java, Sukabumi, West Java	Chicken production	\$2.6 million
P.T. Aica Jaya Sukabumi, West Java	Chicken production	\$.79 million
P.T. Peternakan Bumi Cipete, Jakarta	Pigeon breeding	\$.6 million
P.T. Karang Dara Cirebon, West Java	Chicken production	\$.24 million
P.T. Hana Int. Farm Tangerang, West Java	Cattle Fattening	\$.53 million
P.T. Tendo Ayu Sukabumi, West Java	Chicken production	\$.14 million
P.T. Pejosari Bumi Bogor, West Java	Cattle fattening	\$.96 million
P.T. Dewi RatuHari Tangerang, West Java	Chicken production	\$.3 million
P.T. Lamanoco Enterprise South Sulawesi	Abatoir	\$.24 million
P.T. Karya Bone South Sulawesi	Abatoir	\$.72 million
P.T. Sumatra Dairy Industry Bandar Baru, Sibolangit, Deli Serdang N. Sumatra	Milk cows	\$.6 million
P.T. Hiban Ujung Berung, West Java	Poultry breeding	\$.42 million
P.T. Tore Ujung Pandang, South Sulawesi	Poultry breeding	\$.08 million
P.T. Kerta Bumi Ungaran, Central Java	Hog breeding	\$.60 million
P.T. Cembala Sriwijaya Km. 32-34 Ogamkomering Ilir, Palembang, South Sumatra	Integrated Livestock Ranch	\$10.16 million
P.T. Maesa Manado Turf & Country Co. Minahasa, North Sulawesi	Horse breeding	\$3.04 million
P.T. Elita Idata Bogor, West Java	Poultry breeding	n.a.
P.T. Sampulur Baksana Sleman, Yogyakarta	Poultry breeding	n.a.
P.T. Daya Chick Tangerang, West Java	Poultry breeding	n.a.
Pamulang Stud Ciputat, New Bogor Rd., Jakarta	Horse breeding and training	n.a.
F.A. Peter Cremer Surabaya, East Java/Cirebon, West Java	Cattle fodder peletizing	German-owned joint venture \$.5 million
P.T. Ometraco Surabaya, East Java	Cattle fodder manufacture	Joint venture with German Investors (1969) \$.625 million

Source: Directorate-General for Estate Crops, Industry Sources.

PNP's experienced difficulty due to inexperience in both management and agricultural methods. Some of the estates showed a profit, but many were marginal operations.

Perusahaan Perseroan Terbatas Perkebunan, (PTP) identifies government-owned plantations organized as limited liability corporations. PTP's were established from PN's, beginning in 1969. They have independent management and operate essentially private corporations. They are self-sustaining financially and are not funded by the national budget. In 1976 there were 18 PTP's registered with a total

area of 323,927 hectares. In a relatively short period of time, with the introduction of better management mechanization, and new agricultural methods the newly formed PTP's began to show a profit which helped to raise total estate income to \$626 million in 1975.

Privately owned estates and agricultural businesses.—In 1976, there were 27 privately owned, limited-liability estate companies with an area of more than 175,000 hectares. These included foreign-owned, foreign/domestic joint venture, and domestically owned operations. Privately owned agri-

cultural businesses engage in a wide variety of additional activities such as feed manufacturing, poultry breeding, beef production, and agricultural consulting and advisory services.

Smallholders.—Working on small plots of land with hand tools and sometimes a buffalo, smallholders are the backbone of food crop production in Indonesia. They are also involved to some extent in production of all crops. Smallholder production methods are labor intensive, seed is often of poor quality, and yield is usually low. Much of the output from these small plots is for subsistence or is sold for local domestic consumption. Smallholders located near the major urban areas often operate truck farms and grow fruits for the city market. In many instances, however, production consists of fruits like bananas or coconuts picked from uncultivated trees.

Food Crops

Although rice is the principal food crop, it is not the main staple food on all of the islands. Corn is the basic foodstuff on Madura, Lombok, Timor, eastern Java, and in parts of Sulawesi. In Maluku and the lowlands of Irian Jaya, sago and cassava are basic food crops, while sweet potatoes, yams, and taro form the basic diet in the mountainous regions.

Food crops constitute 60% of the agricultural output and are almost totally for domestic consumption, corn being the primary exception. Food production has grown steadily but erratically during the past decade with weather or disease often having a serious effect on previously successful efforts to increase production. For example, difficulties with insects, disease, and weather in 1975 caused a 2% drop in food crop production after gains of 14% and 9% in 1973 and 1974 respectively.

A great deal of government effort has been directed at increasing both the amount and nutritional value of food available to the people, and the income of smallholders. However, the country's growing population has resulted in a continual struggle even to maintain existing food levels.

Rice.—Rice is looked upon as the index of national prosperity, and in rice-growing areas other crops are considered secondary even if they play a major economic or dietary role. Rice production in 1975 was 29.5 million tons (unmilled) which included 27.7 million tons from irrigated paddies and 1.8 million tons from nonirrigated lands. The vast majority of rice is produced completely by hand labor using draft animals for plowing.

National self-sufficiency in rice production is one of the Government's priorities and continuous efforts are being directed toward fulfilling that goal. Rice production increased at an average annual rate of 3.4% between 1951 and 1971 with the highest gains

made near the end of the period, as a major government development program began to reap results.

A special program, Bimbingan Masal Swa Sembada Bahan Makanan (BIMAS) (Mass Guidance for Self-Sufficiency in Food), was initiated in 1965 by the Government in an attempt to increase food production by smallholders. The program emphasized the expansion of acreage under cultivation with a stated goal of 300,000 additional hectares per year during the period of the first national development plan, an amount which was raised to 500,000 additional hectares for the current plan period. The Government plan also included rehabilitation of farmland on Java through increased irrigation, and both land expansion and irrigation on the outer islands. Improved varieties of seeds, fertilizer, and pesticides were made available to smallholders and cooperatives through government credits provided by Bank Rakyat Indonesia. Agricultural extension services were also provided.

Under the BIMAS program there was a constant increase in rice production, and by 1973, land in the program produced nearly 70% above the national average yield per hectare. Land under rice cultivation grew 143% in 5 years, from 1.6 million hectares in 1968 to more than 3.9 million hectares in 1973. However, BIMAS also experienced administrative and organizational difficulties including a poor rate of loan repayment by participants. In 1970, the program was reorganized and in 1971 was expanded to include other food crops.

Another program, Intesifikasi Masal Swa Sembada Bahan Makanan (INMAS) (Mass Intensification for Self-Sufficiency in Food), extended the services offered under BIMAS to farmers who had proven their ability to benefit from participation in government programs, primarily those who had been successful in the BIMAS program. Because participation in the BIMAS program had raised smallholder's income levels, the Government did not extend financial credits as part of the INMAS program, but instead provided support for loan requests made to other financing sources. In 1976, the Government passed legislation which allows all Indonesians to purchase fertilizer and seeds through government distribution networks, a privilege previously granted only to BIMAS and INMAS participants.

A serious drought in 1972 resulted in reduced rice production, but it increased 10% the following year. Rice production is expected to grow slowly until 1978 or 1979 when additional land expansions and educational efforts are expected to result in higher rates of increase.

In 1973, a problem arose in the Badan Usaha Unit Desa (BUUD) (Village Units), a government organization of agricultural production and market-

ing cooperatives which handle the distribution of fertilizer and pesticides, and are eventually to assume responsibility for production, credit arrangements, and marketing. When the program began, the BUUD committees were also used as the collection agents for the Government's fixed price rice purchases, a role which greatly undercut their ability to gain the confidence of local farmers. The latter task was dropped after 6 months in the face of growing opposition from both farmers and local officials. In the mid-1970's the BUUD was supplemented by the Koperasi Usaha Unit Desa (KUUD) (Village Cooperative Unit).

A major role in rice production is also played by Badan Urusan Logistik (BULOG) (The National Logistics Board), which has authority over the distribution of rice rations, maintenance of national stocks, and stabilization of market prices. BULOG is required to maintain national stocks of 800,000 tons for emergency stores and is responsible for price regulation. If retail prices begin to approach official ceilings, quantities from the national stores are brought into the market to lower the cost to consumers. In addition, BULOG maintains an extensive national distribution system of warehouses and offices to provide all government employees with a rice ration which is still part of their wages. Military rice allotments are also distributed by BULOG. The efficacy of the BULOG distribution system has been subject to considerable criticism.

In previous years, BULOG purchased milled rice for stock purposes, but in 1976 the policy was changed to permit the purchase of unmilled rice. This change was made in order to provide more direct support to small farmers, and because unmilled rice can be stored longer with less waste than milled rice.

In spite of government efforts, the increasing population and higher food consumption have kept actual per capita nutritional gains to a minimum. In addition, government price controls, which protect the consumer by keeping domestic rice prices low, have generally discouraged increased production by smallholders, and have caused many of them to switch from rice to more profitable cash crops. Rice imports peaked in 1973 at 1.8 million tons. In the early 1970's, the Government realized that major increases in rice production would be dependent on development of large-scale farming operations and this should include application of modern agricultural methods and increased mechanization. Foreign investors were encouraged to provide assistance in rice production.

Palembang Rice Estate, Palembang, South Sumatra, is an experimental project of Pertamina, the national petroleum corporation, with Brewer Pacific Agronomics Company (USA) serving as consultants.

Originally scheduled to be the largest rice estate in the world with 20,000 hectares, financing kept the first stage limited to 400 hectares, including 20 hectares in an experimental soybean project.

The project began in 1974 with land clearing operations and the digging of irrigation canals. The first crops, harvested in 1975 and early 1976, showed very promising results with increases of 104% to 127% over yields using traditional methods. The project obtained yields of 4.5 to 5 tons per hectare as opposed to 2.2 tons per hectare from smallholder plots in the area. The project's aim is to eventually get a yield of 8 tons per hectare per year. During the project's second stage on 5,000 hectares, production is estimated to be 40,000 tons per year, which at the present cost for imported rice of \$200 per ton represents an annual foreign exchange savings of \$8 million.

The project is highly mechanized and intensely uses fertilizer, imported triple super phosphate and domestically produced urea, and insecticides, domestically produced diazinon and imported toxphene methyl parathion.

Development of the extensive irrigation system, 6 kilometers of irrigation canals and 8 kilometers drainage canals, has presented considerable difficulties. Collapsing walls and changing tide levels have been a challenge to project engineers but experiments with new dike constructions are continuing.

Although the Palembang Rice Estate project has attracted considerable interest in the area, with farmers coming long distances to observe operations Pertamina's financial problems make future development uncertain.

Much rice in Indonesia is field threshed, and even when factory milled the operation is basic and equipment is old. Rotary or horizontal threshers and sifters are often hand loaded and output is usually hand bagged. Warehousing and storage activities are also labor intensive.

Experiments with storing unmilled rather than milled rice are underway and initial results seem to indicate less waste with the unmilled rice storage. BULOG owns an extensive system of warehouses around the country and has recently completed eight new warehouses with 112,000-ton capacity each as part of the Cakung Warehouse Project at Tanjung Priok. P.T. Kalnasio, a private firm near Jakarta, purchased two new silos for rice storage, but has experienced difficulty in negotiating a storage contract with BULOG.

Corn.—Corn is the main staple food in many of the dryland areas and is a secondary crop in locations where irrigation is not available during the dry season. Corn is also the only food crop that is a major export item.

Corn production has been erratic over the past decade ranging from a high of 3.7 million tons in 1974 to a low of 2.2 million tons in 1972 with a nearly constant 2.65 million hectares under cultivation. Concentrated efforts by the Government and private investors caused 1974 production to exceed the planned amount of 2.6 million tons by 25% giving rise to confidence that 1979 planned production of 4.15 million tons can be met or exceeded. The Government's plans for corn production call for 3.3 million hectares to be under cultivation by 1980.

With the exception of several Japanese financed ventures on Java, Sumatra and Sulawesi, the majority of Indonesian corn production is on labor intensive smallholder plots. P.T. Indocorn, the privately owned corn oil processing company, has been working with local smallholders and cooperatives to increase both land in cultivation and yields to meet the needs of their corn processing plant. (See Food Processing and Packaging in this survey.)

In 1972, feed corn production was only 1% of total corn production, a figure which is expected to rise to 4% or 154,000 tons, by 1980, primarily due to increased demand resulting from expansion of the poultry industry. Feed corn production has been slow to expand primarily because it is a relatively new crop in Indonesia and inexperience in its cultivation has resulted in serious problems. For example, the Mitsui Goro (Japan) 5,000 hectare pilot project in Lampung was considered by most agricultural experts to be a disaster, both for Mitsui Goro and for Indonesia. Previously unknown crop mildew problems began to develop and project management was unable to control it. The result was decimation of the crop.

Human consumption of corn is expected to rise slowly, but the country's increasing demand of corn for processing, its growing use as feed for livestock and poultry, and the rising export markets for both corn and corn products will result in less corn being available for domestic consumption.

Other Food Crops

There are several other important food crops raised in Indonesia.

Cassava is planted in drylands and as a second crop during the dry season in other locations. Although low in nutritional value, cassava is easily grown and used by many of the poor as the major staple in their diet. Production has been fairly steady over the past decade with fluctuations dependent on weather conditions and the availability of low cost rice. Cassava is produced by smallholders, and part of the crop is processed into tapioca both for export and domestic consumption, or pelletized for use as animal feed and exported to European cattle and

dairy farmers. Exports of tapioca and tapioca products such as meal, flour, and waste, have been erratic. Between 1974 and 1975 export tonnage dropped 28%, and export earnings fell from \$24 million to \$7.1 million.

Peanuts and soybeans are earmarked for production intensification programs both for domestic consumption and export as raw products as well as oil extracts. Peanuts are used as an ingredient in many Indonesian foods and sauces. In 1974, 408,000 hectares produced 275,000 tons of peanuts and 1978/79 output is projected to be 350,000 tons. Soybean sales have been rising slowly because consumers tend to maintain established food patterns, but production has been rising steadily primarily due to demand for processing into oil and soy sauce. Production in 1975 was 518,000 tons on cultivated area of 753,000 hectares, and output in the 1978/79 crop year is predicted to be 656,000 tons. Indonesian soybean oil is now reported to be competitive in both price and quality with U.S. food oils. There are no large commercial soybean processing facilities in Indonesia, although an American Soya Bean Association team which visited the country in 1976 expressed interest in establishing a soybean crushing plant. National budget constraints resulting from the Pertamina financial difficulties caused one of the potential partners to withdraw, however, leaving the project temporarily shelved.

Other food crops include sorghum, yams, sweet potatoes, yago, green beans, eggplants, onions and red peppers. These crops are hand cultivated for both smallholder family needs and marginal marketing. There is also some smallholder production of fruits including citrus types, bananas, breadfruit, durian, papaya, pineapple, mango, and mangosteen. Most fruit is raised in house gardens and consumed by the grower the remainder being sold in village markets. In rural areas adjacent to the major cities, middlemen purchase fruits and vegetables for transport and resale in the urban areas.

Commercial Crops

Commercial crops are produced both for export and domestic consumption and account for approximately 20% by value of all agricultural production. Despite setbacks in some years, this percentage has risen slowly through the last decade.

Most production, both smallholder and estate, is highly labor intensive, with varying degrees of mechanization used in field and on-site processing.

Many major commercial crops are not native to Indonesia and were introduced fairly late in the country's history. These include rubber, palm oil, coffee, tea, sugar, tobacco, cocoa, and several spices. Cotton production was also begun relatively late in



Rubber estates continue to rely on hand tapping but improved tapping techniques are being developed.

Indonesia. Experimentation during the colonial period led to the development of varieties most suitable to the country's climatic conditions.

Rubber.—For many years rubber has been the country's leading agricultural export commodity and it is the only major commercial crop to reach or exceed pre-World War II production levels. In mid-1976 Indonesia was second only to Malaysia as the world leader in rubber production.

After a steady gain in rubber production for over a decade to a high of 950,000 tons in 1973, it dropped slightly in 1974 to 943,000 tons as a result of a government program to cut and replant rubber stands which had passed peak production. Growth was only 3% during 1975 and it is not expected to exceed that level in 1976 for an expected production of 995,000 tons. A steady increase of slightly under 3% per year is expected until 1979 when the new rubber plantations will reach maturity. By that year output is projected to increase considerably. Between 1974 and 1975 rubber export earnings dropped 28% as a result of falling prices and reduced demand in the world's automobile industries, primarily Japanese and American. Higher world oil prices have, however, increased the price of synthetic rubber products, and this has in turn recently strengthened the market for natural rubber.

Rubber plantations do not require especially good soil or continual care and historically smallholders constitute the largest number of rubber growers in Indonesia. In the past an Indonesian farmer first cleared a plot of land by cutting and burning the jungle growth to plant food crops for his own needs. After 2 or 3 years the land's natural nutrients were exhausted and the farmer cleared another plot for

farming purposes. However, the first plot was often planted with a stand of rubber trees, and in a few years a small cash crop was obtained. While this pattern was prevalent in Java, on Sumatra, rubber was developed as a major estate crop. Thus, although 55% of the 694 registered rubber growers are located on Java, they account for only 2.6% of the land in rubber cultivation. On Sumatra there are only 279 registered rubber growers, but they hold 74% of the country's total land in rubber cultivation. Similarly, while less than 5% of the number of rubber growers are located on Kalimantan, nearly 23% of the rubber producing land is located there.

Smallholders are still the major producers of rubber in Indonesia. They hold 1.8 million hectares or 81% of the land planted in rubber trees, and produce 70% of the rubber output. Private estates account for 288,700 hectares or 13% of the land in rubber production, while state plantations have only 149,200 hectares or 6%. However, due to better methods of planting, care, and tapping, estate production is higher in yield per hectare and quality. Seventeen government-owned estates produce rubber although most also produce other crops. Rubber from the State plantations is marketed in a cooperative arrangement. Major private rubber estates are the U.S.-owned P.T. Uniroyal Sumatra Plantations Company Limited, Kisaran, North Sumatra, and N.V. Goodyear Sumatra Plantations Company, Limited, Medan, North Sumatra, the London Sumatra Plantation, North Sumatra (U.K.), and Societe Internationale de Plantations et de Finance (SIPEF) S.A., North Sumatra (Belgium).

Both private and government plantations are relying heavily on development of high yield hybrid stock to increase production. One technique is raising young trees in polyethylene bags under controlled conditions in nurseries. The young trees are grown in the nursery for about 2 years prior to permanent planting. Nursery grown rubber trees can be tapped after 5 or 6 years and are in full production in 10 years. Estates usually plant approximately 380 trees per hectare resulting in an annual yield of 3 to 4 tons per hectare.

Three types of rubber processing are used in Indonesia: smoke sheet rubber, crumb rubber, and liquid latex.

Considering the apparently bright prospects in the future for rubber production, the World Bank has approved investment of a \$5 million project for the expansion of smallholder rubber production in North Sumatra. This project will include financial assistance for new plantings, fertilizers, cooperative processing facilities, and providing technical and marketing advice. Financing will be available both to growers presently producing rubber and to those who are interested in entering the field.

Palm oil.—In 1970, after 20 years of stagnation the palm oil industry began to grow, and in 1971 production reached 248,000 tons of palm oil and 56,000 tons of kernels, which surpassed the previous high set in 1939. Output increased 59% during the next 4 years to 403,000 tons of oil in 1975. However, prices peaked in 1974 at \$650 per metric ton, and the drop in world prices caused earnings to decrease 9% from \$166 million in 1974 to \$151 million in 1975. Prices then stabilized and growth continued at a rate above government goals. Production is expected to exceed the 1980 goal of 475,000 tons.

Although oil palms were introduced to Indonesia in 1875, they were first used as decorative plants and cultivation as a crop did not begin until 1917. The commercial potential of palm oil was soon realized and rapid expansion of acreage took place during the 1920's. Many of the trees planted in the 1920's, although past their prime, are still producing today.

Indonesia is now the third largest producer of palm oil in the world with 11% of total production. Malaysia is the world leader with 32% of total production followed by Nigeria with 26%. However, Indonesia ranks second as an exporter with 21% of the world market as compared to the first ranked exporter, Malaysia with 67%. Indonesia presently exports 86% of its palm oil production and exports rose 41% between 1966 and 1973. Domestic consumption of palm oil in the form of soap, margarine, and cooking oil, is expected to take a larger portion of production in future years.

There are 68 estates registered as palm oil producers, 65 of them in North Sumatra. Seven government-owned estates are responsible for 70% of the nation's palm oil production, while 28% is produced by large private estates and only 2% by smallholders. Although there has been only minimum production of palm oil by smallholders, current government plans call for 30,000 hectares to be under smallholder cultivation by 1980.

Government efforts have resulted in both land expansion and yield increases faster than government planners thought possible. Land in cultivation is projected to more than double from 100,000 hectares in 1972 to 235,000 by 1985. Current national development plan goals call for the addition of 113,300 hectares before 1980, an amount that had already been surpassed in 1976 by almost 20,000 hectares. Yield per hectare is also expected to exceed the current plan goal of 3.29 tons per hectare set for 1980 due to the increased use of fertilizers and insecticides and the government's support of programs to cut and replant older, less productive stands. Continued rapid growth in yield will be hampered by several factors: yield increases due to intensified use of fertilizer become less effective when higher rates of production have already been achieved; trees

planted in the last decade will soon reach peak production age, 10 to 35 years, causing output to level off; and the planned increased land under smallholder production has not reached the expected yield rates which are achieved on large estates.

Planting, cultivating, and harvesting palm oil is a labor intensive operation. Seeds and sometimes saplings are hand planted, and left to mature for 5 years. Some oil is harvested after 5 years, but a stand does not reach peak production for almost 10 years. Some trees have produced for up to 60 years, but oil yield usually begins to taper off after 35 years.

Fruit bunches are handpicked by tree climbers and transported by cart or narrow-gauge railroad to the nearest palm oil factory where they are steam sterilized. After processing by extraction and clarification using both hydraulic and screw presses, and settling tanks and centrifuges, the oil is vacuum dried to lower water content, and is graded for both industrial and food value according to glyceride and moisture content.

Sawit Sebarang Estate, Tanjung Morawa, North Sumatra, is under the management of the government-owned plantation, PNP II, but in 1969 was made financially independent to qualify for an Asian Development Bank (ADB) project loan of \$2.4 million for oil palm development. The project included rehabilitation of the estate, new plantings, expansion of milling capacity from 15 to 30 tons of fruit per hour, consulting services, and infrastructure improvements such as road construction and providing new transport equipment.

After project improvements, yields increased significantly and estate production is expected to exceed its milling capacity by the 1976/77 crop year. An additional expansion to raise milling capacity from 30 to 50 tons per hour has begun and is being financed entirely by the estate's own resources.

The Gohor Lama Palm Oil Processing Project was approved for financing by the ADB in October 1975. This \$11.3 million program is focused on the estates operated by the government-owned, PNP II, and includes: Construction of a 30-ton per hour palm oil mill at Gohor Lama North Sumatra; extending and building both narrow and standard gauge railroads; construction, improvement, and maintenance of almost 400 kilometers of roads and bridges; construction of bulk oil storage tanks at Belawan, and both consulting and personnel training services. Target completion date for the project is December 1979.

In keeping with the ongoing program of replacing older rubber stands with oil palm, the Sungai Silau Estate, North Sumatra, received a \$14.6 million loan for replanting the estate and constructing a palm oil processing plant. The plant will be built in

two stages; the first for a capacity of 30 tons per hour will be completed in 1978. Capacity will be doubled in the second stage. The loan, signed in July 1976, is 51% from Bank Expor-Import Indonesia and a government-owned plantation, PNP V, and 49% from Bank Pembangunan Indonesia.

Some problems have arisen in the United States related to the competition that Asian palm oil is presenting to soybean products, and the use of U.S. funds through international aid programs to support growth in the palm oil industry. One acre of oil palms can yield well over a thousand pounds of oil while an acre of soybeans yields considerably less. U.S. soybean growers have appealed to Congress for restrictions on palm oil imports. As of mid-1976 no such legislation had been passed but there is concern in both Indonesia and Malaysia that they may be asked to consider voluntary restraints.

Coconut.—Over 1.5 million tons of copra were produced in 1975, with nearly 99% of production coming from smallholders who harvest from uncultivated native trees and sell to local processors. Coconut trees are indigenous throughout Indonesia but are primarily found in the outer islands. In addition to native trees, there are 227 registered plantations of which 40% are in Sulawesi.

Copra was one of the nation's leading export commodities in the early third of the century with exports averaging 515,000 tons annually between 1935 and 1939. However; war, neglect, age of the trees, disease and pests took a heavy toll on production, and by 1966 exports had dropped to 158,000 tons. Production declined steadily in the decade between 1963 and 1973 as trees passed their prime bearing years. Since coconut oil is the principal cooking oil in Indonesia the Government became concerned about domestic copra supply. During the period of the first national development plan a program of new tree plantings was instituted, and in 1973, the export of copra and copra products was banned. The ban was later relaxed, but the Government maintains control of both export quantities and domestic prices in order to ensure adequate supplies for domestic markets. The results of these efforts were a 12% increase in production between 1968 and 1973, and a 25% increase between 1973 and 1976 as new plantings began to mature.

The current national development plan calls for planting an additional 225,000 hectares in coconut trees through the distribution of four million seeds, plus a special program which involves a new variety of fast maturing "super seeds." The current plan also puts an emphasis on pest and disease eradication, fertilizer use, and tree care. It is hoped that these efforts will increase output to 1.9 million tons by 1980. (For information on coconut oil produc-

tion see Food Processing and Packaging in this survey.)

Sugar.—One of the most significant developments in Indonesian agriculture during recent years has been the increase in production of sugarcane, which had declined substantially from levels achieved during the colonial period. Dramatic increases began in 1974 when the Government focused its attention on the rehabilitation and extension of sugar plantations. Sugarcane production in 1975 was 13,834,000 tons, a 15.6% increase over the 11,967,000 ton harvest in 1974. This increase was paralleled by an 11% increase in yield, with output rising from 11.3 to 12.5 tons per hectare, which, though impressive, does not match the pre-World War II yields of 18 tons/hectare. However, as the country's standard of living rises, domestic demands are likely to increase sharply to more than offset production gains, and it is expected that sugar will remain an import item for several years. Government plans call for self-sufficiency in sugar production by 1982.

Sugar production is centered in 56 estates, all but one located on Java. Eight government-owned plantations are involved in sugar cultivation and supply 50 of the nation's 57 sugar mills. In 1974, some 24% of total sugarcane production was attributed to smallholders, but this figure is somewhat misleading due to land leasing arrangements under which sugar mills lease irrigated smallholder lands for a 16-month period. The land then reverts to the owner for the production of rice and other crops.

Sugar production was brought to Indonesia in the late 1600's by the Dutch East India Company. As sugar became a high yielding source of earnings the Dutch established research stations, and between 1870 and 1900 sugar production quadrupled. However, sugar and rice require similar types of soil conditions to flourish and as sugar markets increased these two crops began to compete for the same land on Java. This led to the development of the land lease system which is still creating problems in the sugar industry.

Prior to World War II Indonesia was the major sugar producer in the world, but the years of war, the following struggle for independence and political upheaval, left the industry at a standstill by the late 1960's. Production increased slowly until 1974 when the Government began its program of rehabilitation and construction of sugar mills. Although this program has already produced significant gains, agricultural experts feel that more attention will have to be directed toward improving field production before additional increases can occur. In Indonesia, sugarcane is cultivated, harvested, and trimmed by hand, with the cane then transported by cart or narrow-gauge railroad to the nearest sugar mill. The Government is now considering the expansion of sugar



The sugar cane harvest is underway in East Java.

development programs in South Sulawesi and South Central Sumatra where it will be feasible to use larger scale production methods.

With the exception of the mills presently undergoing rehabilitation, most sugar mill and refinery equipment in use is the original pre-World War II machinery from the Netherlands and is at least 40 years old.

A moderate percentage of cane produced by smallholders undergoes a crude boiling and air evaporation process rather than going to the mills, which results in a coarse brown sugar known as Jaggery, often used in rural households.

In 1975, the Government opened contract bids for six new sugar mills, each with an annual capacity of 50,000 to 60,000 tons. Construction is expected to be underway by the end of 1976. Trial production is planned for late 1978 with full production scheduled for spring, 1979. Total cost including milling equipment, infrastructure, transportation equip-

ment, and plantation improvements is estimated to be \$900 million. The six mills are described below.

Jatitujuh Sugar Mill, Cirebon, West Java is the largest of the mills with a projected processing capacity of 4,000 tons of sugarcane per day. Jatitujuh will process the output of the 12,000 hectares presently handled by an existing mill plus the production of an additional 12,000 hectares being planted. The total cost of the Jatitujuh Mill is estimated to be \$90 million with milling equipment budgeted at \$44 million.

Each of the other mills has a projected capacity of 3,000 tons of cane per day and is estimated to cost \$80 million.

Rendeng Baru Sugar Mill, Kudus, Central Java will replace an older mill presently operating at Rendeng. Cane will be provided primarily by smallholders.

Ceper Baru Sugar Mill, Klaten, Central Java will replace a small mill presently serving the area.

Planned improvements include expansion of the sugar plantation to 12,000 hectares.

Kunir Baru Sugar Mill, will be located between Blitar and Tulung Agung, East Java, and will replace the Mojopangung Mill.

Benculuh Sugar Mill, Banyuwangi, East Java is scheduled to replace the Wringin Mill.

Bojonegoro Sugar Mill, a new mill, is planned in the area of Bojonegoro, East Java.

Initial contract bids on the mills varied in price by as much as 75%, and tender procedures were complicated by the fact that some of the bids did not adhere to specifications. After several suppliers filed complaints, bidding was reopened and bids recalculated on a common basis.

Feasibility studies are underway for an additional six mills, one in South Sulawesi, two in West Java, and three in South Sumatra, with a total capacity of 480,000 tons per year.

Both the World Bank's International Development Association (IDA) and the Asian Development Bank (ADB) have granted credits for the rehabilitation and expansion of existing sugar mills. IDA provided \$50 million for work on nine mills and ADB has loaned \$17.5 million for expansion and rehabilitation of two mills. However, the Government has indicated that additional funds will be required to complete the projects. These and other rehabilitation projects are projected to increase annual capacity by 200,000 to 300,000 tons.

In 1976, a major chemical firm was looking for large dependable sources of sugarcane for the establishment of a plant to produce alcohol, high grade animal feed, yeast, and carbon dioxide for use in the production of dry ice. It has been projected that 4,000 hectares of cane would result in 100,000 liters of alcohol and 1,200 tons of animal feed. The cost of by-products is expected to pay for plant operations with alcohol production as a total profit item.

Coffee.—In the late 1960's coffee was second only to rubber in importance as an agricultural export commodity. In 1975, production was 228,000 tons of which 140,000 tons (61%) was for export markets. Although coffee production increased 16% from 197,000 tons in 1974 to 228,000 tons in 1975, the export value decreased 6%, from \$101 million to \$95 million due to fluctuations in the world market.

Approximately 384,000 hectares are under coffee cultivation, 90% of which is in the hands of smallholders. This represents a complete shift from the pre-World War II period when the majority of coffee production was on estates. Smallholder cultivation is concentrated on Sumatra, while the majority of estate production is in East Java. Cultivation is labor intensive. Sun drying and roasting, when done,

are accomplished in the field with a minimum of equipment.

The growing demand for Indonesian coffee in the Netherlands, the United States, and Japan will continue to encourage coffee cultivation. These factors coupled with government policies supporting rehabilitation of existing coffee estates should result in fulfillment of the Government's goal of 325,000 tons of coffee production by 1980.

Tea.—Indonesia was once the third ranking tea exporter in the world with 1938 production reaching 72,000 tons. However, World War II left the estates virtually destroyed and during the following War for Independence, tea production shifted into the hands of smallholders. In the late 1960's the Government began a program to rehabilitate some of the old plantations and establish new estates in an attempt to increase foreign exchange earnings.

In 1975, there were 138 tea estates, 105 of which were in the cool mountainous areas of West Java. Lipton Tea (USA) and Brooke-Bond (U.K.) are among the largest private producers. Estate production is primarily for export while the smallholders fulfill domestic consumption needs. Both estate and smallholder production is highly labor intensive, largely involving hand planting and picking. Field drying is a common practice, although some of the larger estates utilize mechanical drying machines.

In 1975, total production was 67,000 tons, a 16% decrease over the 1974 figure of 77,000 tons but due to increasing world prices, export income rose 16%, from \$43 million in 1974 to \$50 million in 1975. The increase in profits encouraged new plantings and production figures were expected to rise in 1975. Government plans for 1985 call for a 47% increase in estate production and an 81% increase in smallholder output. These figures are primarily to cover increased domestic consumption and are not assuming large export increases.

Optimism concerning future growth in the tea industry led the World Bank to supply a \$2 million loan for the construction of a tea processing plant at Rancabali near Bandung, West Java. The plant opened in July 1976 and has a annual capacity of 2,000 tons of processed tea. The plant uses mechanized sorting, drying, and other processing and packing equipment.

Spices.—When Columbus set sail in 1492 looking for a short route to the East, he was attempting to find the Molluccas in the Indonesia archipelago, known then as the "Spice Islands." At that time spice trading was a very lucrative business and all of the major maritime nations of Europe were attempting to gain control of the major sources of spices. These quests led to both internal and international conflicts as various alliances were arranged and broken;

and economic expediencies became the foundation for many political arrangements. Several powers had a brief toehold in Indonesia, but in the 17th century the Dutch came, expanded control throughout the islands, and remained for over 300 years.

In 1602, a charter was granted to Vereenigde Oost-Indische Compagnie (VOC, United East India Company, also known as the Dutch East India Company), and by the end of the 17th century, they had evicted all other foreign powers and gained control of both the growing and trading of spices. For many years the primary income of this company was based on their spice monopoly.

Although spice production suffered greatly during World War II and the period immediately following it, the industry began to recover in recent years and has had an annual growth rate of over 20% since the early 1970's.

Pepper was an important world commodity prior to refrigeration when it was used in food preservation. Before World War II Indonesia led in world pepper production, and is now second to India. Pepper is grown exclusively by smallholders, and almost 75% is exported. Pepper production is estimated to have increased 3.5% annually from 31,100 tons in 1972 to 34,500 tons in 1975. Expansion of land under cultivation, and assistance in pest control are predicted to increase yield per hectare significantly by 1980. The Government is seeking to assist smallholders by providing technical guidance to improve crop quality and by attempting to develop new markets for export sales.

Indonesia was formerly an exporter of cloves, but in the last decade has had to import increasing amounts of this spice to support its growing clove-spiced cigarette industry. Between 1970 and 1975 domestic clove production increased from 15,000 tons to a high of 22,000 tons in 1973 and then declined to 17,000 tons. During the same period imports grew from 7,700 tons to 29,000 tons. The Government has expressed concern over the loss of foreign exchange earnings and is investigating ways to increase local production.

Indonesia also grows other spices such as nutmeg, cinnamon, and cocoa. Production varies greatly from year to year as both smallholders and estates often use these crops to fill in during crop rotations. The Government is studying ways to stabilize production to provide a solid base for expansion into intermediate processing.

Cotton.—Although cotton production has not increased significantly since 1940, the needs of the growing textile industry and parallel import requirements are causing the Government to intensify programs to increase domestic cultivation of cotton.

Total production in 1974 was 4,600 tons which was only 10% of total domestic consumption. Cotton is grown primarily by smallholders in East and Central Java. There is a total of 9,000 hectares under cultivation in the country. Although the area under cultivation was declining in the early 1970's, higher quality seeds and better farming methods were increasing the cotton yield per hectare. The Government hopes to increase both area and yield so that by 1980 a total area of 70,000 hectares will produce 30,000 tons of cotton. Even these ambitious goals would meet only half of projected domestic consumption needs.

The Government has launched studies, educational efforts, and support programs to encourage farmers to increase cotton production. Surveys are being conducted to locate new sites in South Sulawesi. Perum Kapas (The Government-owned cotton company) is working with the Central Java Provincial Government to add 37,000 hectares to cotton cultivation using the BIMAS system of incentives. Implementation of the BIMAS program, described earlier, is scheduled for mid-1976 with support provided in the form of fertilizer, cotton seeds, insecticides, advice concerning cotton growing techniques and disease eradication, and bank credits through Bank Rakyat Indonesia. Funds from the bank carry an interest rate of 1.25% per month and must be repaid within 7 months. The program also calls for construction of seven ginning facilities at as yet unspecified locations.

The major hindrance to success in cotton growing programs is the present low prices of cotton in relation to production costs. Even support under the BIMAS program will not make the cultivation of cotton highly profitable unless the Government either raises its ceiling price or drops the present fixed price policy. Guaranteed markets and assistance in marketing procedures may also be necessary to encourage increased cotton production.

Tobacco.—Tobacco is one of the few agricultural commodities that is both imported and exported. Export earnings rose 6% between 1974 and 1975, from \$35.5 million to \$37.7 million, while import expenditures dropped 4% in the same period of time, from \$12.8 million to \$12.3 million. This trend is expected to continue and by 1982, exports will have doubled from the 21,300 tons exported in 1972 to 42,950 tons; while imports are expected to rise only 85%, from 7,600 tons in 1972 to 14,100 tons a decade later, resulting in a net gain in export earnings.

Tobacco production has been erratic over the past 20 years. For example, after holding fairly steady since 1969 production suddenly dropped 13% in 1974 only to be followed by a 25% increase the next year. However, both the world and local economies

had not recovered sufficiently to absorb the large gains, and tobacco growers were left with a surplus in 1975. Indonesian cigarette manufacturers are hoping for a rise in the standard of living which they feel will encourage increased tobacco consumption. (See Food Processing and Packaging chapter.)

Tobacco growing is centered in North Sumatra and East Java and is primarily a smallholder crop. Individual farmers hold 93% of the land planted in tobacco and account for 88% of total production. Most of the smallholder output is used domestically while the majority of estate production is exported for use in the manufacture of cigars. The excellent leaf from Deli, North Sumatra, the Yogyakarta area in Central Java and Jember area in East Java are highly regarded as wrappers by quality cigar manufacturers in Europe.

The current national development plan calls for a 41% increase in smallholder tobacco production and a 40% increase in the output of the estates. These increases are planned to be the result of higher yields rather than increased acreage and will be primarily of Virginia type tobacco which is used in both clove-spiced and western style cigarettes. No significant increases are expected in other varieties.

Livestock.—Livestock raising is a relatively minor industry in Indonesia. Stock includes goats, sheep, pigs, ducks, and chickens for domestic consumption and cattle for both domestic markets and export (see table 5). A large part of the Indonesian livestock industry is also the raising of buffalo, oxen and some horses for draft purposes. With the exception of increases in pig and poultry populations, the number of livestock remained fairly static over the decade until 1975, when declines were experienced in most livestock types.

There are four main centers of livestock production: South Sulawesi, Bali, East Java, and East and West Nusa Tenggara. Livestock operations on Java, Madura, and Bali have difficulties in obtaining sufficient land to support herds due to priority land use for food production. Consequently there are many smallholders who attempt to raise a few cattle on 1 to 3 hectares of land. The milk from these animals is poor quality and the meat high priced. These factors do little to encourage changes in the eating habits of the population which would increase the consumption of meat and milk products. In

other parts of the country available tropical grasses are low in nutritive value, and although experiments with growing new grasses have been conducted most have not been very successful. In addition to the many smallholders, there are several firms attempting to establish commercial cattle operations. The largest of these are the U.S.-financed firms, P.T. United Livestock in South Sulawesi and Virginia International. Virginia International operates several ranches near Bogor and Palembang. In addition, the World Bank is supporting two experimental ranches in South Sulawesi.

The Government, at both the national and provincial levels, is attempting to build up the cattle industry, primarily to increase export earnings. The national Government, through the Directorate-General of Animal Husbandry has proposed a system of national and regional cattle breeding centers which would include, in addition to breeding services, educational programs for farmers and training for artificial insemination. Government programs also call for initial experimentation in growing grass suitable for pastureland, expansion to seed production, and the establishment of slaughter facilities with quality grading. The canning industry is also receiving encouragement from the Government as a means to support expansion of livestock production. Government programs include limiting the export of live animals and providing 5-year bank credits for small investment and working capital needs. There has been some criticism by agricultural experts of this latter program who say it takes a minimum of 10 years to establish a herd and that 10- to 15-year bank credits would be more realistic.

In 1973, the North Sumatra Animal Husbandry Department launched a small, experimental program in both artificial insemination and cross breeding. The program also was directed toward improvement of pastureland, disease prevention, and the encouragement of large scale investment in raising cattle for the export market. In the first year of the artificial insemination program 200 cows were bred, a figure which doubled the following year. Acceptance was excellent, and in 1975, 3,000 cows were bred by this method. Even considering the preference by Indonesian farmers for natural livestock breeding, continued enthusiasm apparently exists and officials are discussing the possibility of breeding up to 10,000 cows by artificial insemination within a few years. However, this assumes very large growth in the size of present herds. Rapid livestock growth would also be required to support another plan of the Government to build a large frozen semen factory in Bandung with assistance from a New Zealand organization.

The Livestock Development Project is a program of the Indonesian Department of Agriculture, Di-

Table 5.—Indonesia: Export Value of Cattle and Cattle Products

	(In thousands of U.S. dollars)					
	1970	1973	1974	1975	1976	1980
Cattle	2,031	3,723	3,909	4,221	4,559	6,155
Hides	5,009	10,523	13,375	16,050	18,297	27,079
Bones	172	159	161	162	164	170
Total	7,212	14,405	17,445	20,433	23,020	33,404

Sources: Central Bureau of Statistics trade sources.

GOVERNMENT ROLE

rectorate-General of Animal Husbandry that is directed toward improving the cattle industry in North Sumatra (16,000 hectares) and South Kalimantan (17,600 hectares). Plans include assistance in establishing commercial ranches and the creation of supportive research and educational facilities. Project costs are estimated at \$8 million and the Government is seeking \$5 million in foreign investment.

Indonesia's poultry industry has grown rapidly since its establishment in the mid-1960's, and it is expected to continue expanding at a high rate in future years. Eggs are the major poultry commodity and egg production is expected to continue rising in spite of difficulties. Weather, disease, and poor feed have kept yields low with annual average production per chicken of 150 eggs as compared to 240 per year in most developed countries.

In 1973, the total poultry population was about 100 million of which only 3.5 million were improved breeding stock from the United States, Europe, and Japan. However, in the next 3 years through mid-1976, although the total poultry population remained stable, improved stock increased almost tenfold. In spite of these impressive gains, increases in broiler production are hampered by lack of transportation, marketing difficulties, and problems in providing feed.

Government regulations permit poultry breeder stock to be imported tax free, but forbid import of commercial layers and day old chicks. As of mid-1976, there were no established poultry breeding stock operations in Indonesia, nor was there any commercial packing industry as considered by western standards.

In 1975, there were three million layers in the country and industry sources predicted that this figure would rise to seven million by 1980. Also in 1975, there were two million broilers and it is estimated that this number will rise to five million by 1980.

Dairy cattle.—Domestic consumption of milk and dairy products is very low in Indonesia. (See Food Processing and Packaging chapter.) Low per capita income, traditional taste patterns, and lack of refrigeration are the main factors behind the slow growth in milk consumption. Due to these factors farmers have not risked the capital needed to begin or expand dairy operations. However; if the Government decides to put financial support behind planned programs for expansion and improvement of dairy herds, provision of feeds, and improved marketing facilities, milk production would more than triple between 1975 and 1985.

Major responsibility for regulation of Indonesian agriculture is with the Department of Agriculture which is divided into six Directorates. Four of these Directorates are directly involved in the policymaking and administration: Directorate-General for Food Crops, Directorate-General for Estate Crops, Directorate-General for Animal Husbandry, and the Agricultural Research and Development Board. The remaining two Directorates, Fisheries and Forestry, are discussed in the appropriate sections of this survey.

In addition to the Directorates within the Department of Agriculture, several other government departments are involved in agricultural planning and development. These include: the Deputy for Regional and Local Development within BAPPENAS (the National Development Planning Agency), the Directorate-General for Rural Development and the Directorate-General for Agrarian Affairs within the Ministry of Internal Affairs, the Directorate-General for Transmigration and the Directorate-General for Cooperatives, both of the latter in the Department of Manpower, Transmigration, and Cooperatives. Addresses are as follows:

Ministry of Agriculture
Jalan Taman Cut Mutiah, 11
Jakarta

Directorate-General for Food Crops
Jalan Salemba Raya, 16
Jakarta

Directorate-General for Animal Husbandry
Jalan Salemba Raya, 16
Jakarta

Directorate-General for Estate Crops
Jalan Lt. Jen S. Parman, 73
Slipi, Jakarta

Agricultural Research and Development Board
Jalan Taman Cut Mutiah, 11
Jakarta

Deputy for Regional and Local Development
(BAPPENAS, National Development
Planning Board)
Jalan Taman Suropati, 2
Jakarta

Directorate-General for Rural Development
Jalan Pasar Minggu
Pejaten, Jakarta

Directorate-General for Agrarian Affairs
Ministry of Internal Affairs
Jalan Singamangaradja, 2
Kebayoran-Baru
Jakarta

Directorate-General for Transmigration
Department of Manpower Transmigration and
Cooperatives
Jalan Let. Jen Haryono, MT
Cikoko, Jakarta

The government-owned estates were originally grouped together and administered by crop, but they

were later divided into four geographic regions for administration. The four district headquarters are: Medan, Bandung, Semarang, and Surabaya. The Sugar Projects office in Surabaya, and the government plantations in North Sumatra have begun experiments with joint marketing procedures.

The Government has also increased its efforts in the field of agricultural education. Through the Department of Education the Government is developing agricultural and technical programs to be included in formal educational institutions, and through the Department of Agriculture is providing informal education through cooperatives. The Agricultural Development Council is working with both the Department of Agriculture and the Department of Education to design agricultural training and research programs at the higher education and graduate levels. The Council's address is: Jalan Melawai 10/5 Blok M, Kebayoran, Jakarta.

The Government is also attempting to put more emphasis on agricultural projects done by research stations. Some of these stations will do general research such as soil studies, while others focus on a particular crop. This latter type includes tea, to be researched at Pangalengan, West Java; palm oil at Marihat near Siantar, North Sumatra; rubber at Tanjung Morawa, North Sumatra; tobacco at Medan, North Sumatra; and sugarcane at Pasuruan, East Java.

Agricultural products of the government plantations are marketed by government offices in Europe: INDOHAM in Hamburg, DITH in Bremen, and Yayasan Perrim, also in Bremen.

TRENDS, PROGRAMS, AND PROJECTS

Agriculture has historically been a political as well as an economic matter in Indonesia. This fact continues to effect many of the decisions in this sector.

Prior to World War II, 60% of the nation's export earnings came from agricultural commodities. These exports were mainly agricultural products from large estates which accounted for only 8% of the cultivated land, but were usually operated by foreign managers who utilized advanced crop techniques, on-site processing operations, and research facilities. The estates suffered due to neglect during World War II and the following War for Independence and production declined steadily.

In 1957, the Government nationalized the property of Dutch owners, and in 1960 passed an agrarian law, by which over a half-million hectares had been distributed for smallholder farming by 1964. Also in 1964 the land of other Europeans was nationalized, and management of the agricultural prop-

erty of American owners was taken over the following year. The former estate properties experienced serious difficulties resulting from management problems and shortages of agricultural expertise, and in 1967, much of the land was returned to former foreign owners. The nationalized Dutch property however, remained under the ownership of the Indonesian Government.

The Indonesian Government made increased agricultural production the top priority of its first national development plan, Repelita I and actively sought technical advice and credit from foreign sources. The estates received the majority of attention from both the Government and foreign investors and extensive rehabilitation programs were undertaken. Results were slow in coming, but the basis for later growth had been established.

During the late 1960's however, the plight of the small farmer became progressively worse, and the gap between the living standards of the villages and the cities widened. Despite its importance to the nation, farming became increasingly unrewarding for those involved. Policies such as price ceilings and crop assignments tended to favor the urban consumer, and farmers who were already living at the poverty level began to look to the cities for additional sources of income. In many rural areas up to two-thirds of the men spend a portion of the year in cities to earn additional income.

The first government-assisted programs for smallholders ran into continual difficulty due to poor management and policies that attempted to apply programs equally throughout the country without giving proper consideration to the vast differences in farming conditions, population patterns, and cultural values.

Serious revamping of government policies for smallholders occurred after the BIMAS and INMAS pilot projects, described earlier, and results have been encouraging. Improvement of smallholder farming is one of the stated goals of the current national development plan, including an increased emphasis on expansion of irrigation projects and higher production of secondary crops. However, acute rural poverty still exists throughout Java, Madura, and Bali. Tensions have been rising, and in many places it is a question of whether planned programs of assistance can be implemented soon enough to avoid serious difficulties.

The Government has been criticized for apparently considering employment more important than production, for focusing attention on processing and neglecting field improvements, for policies that favor the urban dweller over the rural farmer, and for investing funds in prestige, high visibility projects when the same amount of funds might have achieved

greater results in a different activity. For example, the mechanization of certain agricultural operations could increase output, but managers are not generally permitted to reduce employment. Some agricultural experts say that for the money spent on several irrigation projects on Java, three to ten times the acreage on Sumatra or Kalimantan could have been made productive leaving sufficient funds to permit the building of supporting infrastructure.

One of the Government's attempts to alleviate pressures caused by the uneven distribution of population has been the revitalization of the transmigration program. Originally started by the Dutch in the latter half of the 19th Century to provide labor for plantations on Sumatra, official resettlement programs began again in 1951, although no major population shifts occurred until the early 1970's.

Under the new resettlement programs families are recruited to move from the overcrowded islands to designated locations elsewhere. Transportation is paid and funds are made available for reestablishing homes and farms. The enlistment program under the first national development plan was fairly successful in terms of reaching or exceeding its goals. During the first 5 year plan period (1969/70-1973/74) the target for transmigration was 40,566 families. A total of 53,897 families (199,059 persons) were actually moved during the period. Difficulties for both the Government and the participants caused a significant drop in 1975. The average level of income did rise slightly after transmigration, but land allotments were low (2 hectares including housing), infrastructure, such as roads, water supply etc., was not provided and there was a lack of capital and supporting services. Critics claim that it was simply moving subsistence farming from one location to another, and that the 180,000 persons moved during the first national development plan period did not even keep up with population growth on Java.

The program has been revised under the current national development plan and now includes larger land allotments (up to 5 hectares of dry-farming land), provisions for infrastructure and supporting services such as school and health services, technical assistance, and an increasing emphasis on cooperative farming and marketing. Recruiters are also looking for professions other than farming in order to establish more fully integrated communities. Under the current plan, recruitment goals are to increase each year, reaching 160,000 families by 1978/79. Serious attention to a program of this scope will require administrative reorganization and extensive funding resources, both domestic and foreign.

Several international agencies have given support to various transmigration activities including \$1.2 million from the United Nations (UNDP), \$50 million in financing from the World Bank (IBRD), and

over \$20 million from the U.S. Agency for International Development program (USAID) for highway and irrigation improvements to support transmigration communities in Luwu, South Sulawesi.

In addition to projects directed at specific programs or single crops, international support has also been given to general development programs in Indonesian agriculture. These include loans and technical assistance projects through the Asian Development Bank, and U.S. assistance for improvement of rural roads, expansion of higher educational facilities in agriculture, rural public works programs, and commodity assistance through programs such as the U.S. Public Law 480 (see table 6).

Since 1967 approvals for foreign business investment have been granted for agricultural projects with a total capitalization of \$106.2 million. Of these projects 29% or \$31.2 million have been implemented.

The Government is encouraging foreign investment in joint ventures for intermediate processing of agricultural products but has restricted foreign investment in production of several agricultural commodities and in certain locations. The Government applies a four-point measure to proposed foreign investment projects in agro-industry: (1) Will the project create employment opportunities? (2) How much foreign exchange will it generate by increasing exports or reducing imports? (3) What kind of technology is required, what plans are included for the transfer of technology, and what is the need in Indonesia for the type of technology? and (4) What are the prospects that additional development will be realized by the project?

Increased efficiency is not necessarily the prime determinant in decisions regarding foreign investment. For example, projects with food processing potential would be given a higher rating than one resulting in a highly mechanized rice estate. Another example of the type of project that would receive a favorable review is a feed mill project which would both support the cattle industry and encourage small farm growth by providing an outlet for the sale of corn and sorghum.

GROWTH PROSPECTS

Although Indonesia's soil is generally rich, the natural resources of the nation are only one of the many factors related to growth in agro industries.

In spite of being the top priority of the Government during the first national development plan, Repelita I, agriculture has not grown as fast as other parts of the economy, and it still faces difficulties in taking full advantage of available resources. Although the plan goals called for 4% to 7% annual growth

Table 6.—Indonesia: Agro-industry-Major Projects, Pending, 1976

Project	Focus	Cooperating Agencies/Investor ¹	Funding/ Investment
CROP PRODUCTION/ANIMAL HUSBANDRY			
			(US\$ millions)
Integrated Livestock Development	Assist small farmer to increase production of meat for home consumption, and to increase commercial feed industry	UNDP and the Directorate-General of Animal Husbandry	Pending, UNDP 1.2
Rainfed and Upland Crops	To develop rainfed and upland crops primarily in connection with transmigration	UNDP & the Department of Agriculture	Pending, UNDP 1.25
Strengthening of Animal Health Services	Advisory services in the Eastern Islands to reduce animal mortality by improving disease prevention, treatment, and control. Includes establishment of training center and laboratories	UNDP and the Directorate-General of Animal Husbandry	Approved, UNDP 1.0 Pending, UNDP .9
Agricultural Research	Focused on rice research	Central Research Institute for Agriculture (CRIA) at Bogor	USAID .09 (World Bank will provide funding after August 1976)
Six Indonesian Government Sugar Mills/. Sugar Cane Estates (Phase I) East & Central Java	Sugar cane estates and mills	Export Credits	350-400
Six Indonesian Government Sugar Mills/. Sugar Cane Estates (Phase II) South Sumatra, West Java, South Sulawesi	Sugar cane estates and mills	Export Credits	5-600
Manufacturing of shag tobacco Yogyakarta	n.a.	Douwe Egberts Tabaks Maatschappij, N.V. De Erven De Wed J. Van Nelle (Netherlands) & P.T. Purosani	.7
Sugar Mill, Lampung Province	n.a.	Kwok Investment (Hong Kong) & P.T. Redjo Sari Bumi & P.T. Pipit Indah	65
Cassava Estate & Pelletizing plant Lampung	n.a.	Waven Input Geseleschaft Krohn & Co. joint venture with C.V. Progressive	2.2
Cassava estate & Pelletizing plant Lampung	n.a.	Haven Y Scheepvaart Bedrijven joint venture with C.V. Progressive	2.2
Silo Project, Lampung	n.a.	(Netherlands) with P.T. Partisipasi	B.V. Granaria 4.7
Coffee estate including bean processing, South Sulawesi	n.a.	Sulawesi Development Co. (Japan) with P.T. Utesco	2.7
PTP IX, Tobacco and Palm Oil..... plantations, Deli Serdang, North Sumatra	n.a.	Indonesian Government	.1
Cassava plantation, West Sumatra	n.a.	P.T. Pesico (Private)	.5
PTP VI, Oil Palm, North Sumatra	n.a.	Indonesian Development Bank & IBRD	n.a.
PTP I & III, Oil Palm Aceh & North... Sumatra	n.a.	Dutch assistance	n.a.
PTP II, Oil Palm	n.a.	ADB	11.2
GENERAL AGRICULTURAL DEVELOPMENT			
Selective Farm Mechanization Survey ..	To improve productivity by introducing selective mechanization and maximize use of multi-cropping	UNDP and the Department of Agriculture	Pending, UNDP .02
Agricultural Planning	Strengthening the planning capacity of the Department of Agriculture with emphasis on Regional planning, sector and sub-sector studies, and introduction of technology	UNDP and the Department of Agriculture	Pending, UNDP 1.5
Tractor Hiring Station	Creation of a center for technical training, repair and maintenance, and organization of tractor and machinery hiring services. Also, mobile repair and maintenance services in rural areas	UNDP and Directorate-General for Agriculture	Pending, UNDP .25

See footnote at end of table.

Table 6.—Indonesia: Agro-industry-Major Projects, Pending, 1976—Continued

Project	Focus	Cooperating Agencies/Investor ¹	Funding/ Investment
<i>GENERAL AGRICULTURAL DEVELOPMENT—Con.</i>			(US\$ millions)
Development of Agricultural Machinery for Local Manufacture	To assist Government and local manufacturers to support industry and improve designs for local production of high quality, inexpensive threshing and tilling equipment	UNDP and the Directorate-General for Basic Industries	Pending, UNDP .1, Government of Indonesia .02
Rural Works	Promote greater productivity and rural economic development	USAID	USAID 6.8 (loan)
Sederhana Irrigation and Land Development Project	Simple irrigation and agricultural improvement projects to be done by community in 24 provinces		USAID 20 (loan)
Voluntary Agency Co-Financing	Local level rural development and vocational training at 25 various locations	Various agencies	USAID & others .04
Title I Credit Sales Agreements	P.L. 480 Commodity Credit Sales	n.a.	USAID 43.1
Grant Food Aid	P.L. 480 Grant Food Aid	n.a.	USAID 4.5
Luwu (South Sulawesi) Area Transmigration Development Project	Multipurpose Development Package	USAID and others	USAID 15, and others totaling 42
Transmigration & Rural Development Project, Baturaja, Lampung & South Sumatra	Transmigration & Rural Development	IBRD	30
Livestock Development Project	To increase livestock production, to improve the quality of local breeds, to establish commercial type ranches, to provide research and marketing networks	Indonesian Government and foreign interests	\$8.0 Seeking \$5.0 in foreign support
<i>AGRICULTURAL EDUCATION</i>			
Cooperative Development and Training	Assist in planning and running of cooperatives including education and training with the co-operative Training Center. Will work closely with ADB project in East Java	UNDP and the Directorate-General of Cooperatives	Pending, UNDP 1.05 Government of Indonesia .2
Application of Radiosotopes	To standardize measurement of animal protein intake, improve prevention of animal disease, and train technicians in research methods	UNDP and National Atomic Energy (BATAN)	Pending, UNDP .1 Government of Indonesia .03
Development of Training Center for Rural Housing	Establish a training institute for housing development in the rural areas, to teach management, administration, and control of rural housing development programs	UNDP and the Department of Public Works and Electric Power	Pending, UNDP .15
East Java Agricultural Project	Technical Assistance to improve farming methods and yields	ADB and the Directorate-General of Agriculture	2.7
Food Crops Extension Project Throughout Indonesia	Extension and education program	IBRD	22
Agricultural Education for Development	Upgrading of agricultural education. Includes scholarship funds for overseas training	Provincial Universities	USAID 5 (loan)

¹ International funding sources: UNDP (United Nations Development Program), USAID (U.S. Agency for International Development), IBRD (International Bank for Reconstruction and Development/World Bank), ADB (Asian Development Bank).
Source: Department of Agriculture, USAID, UNDP, IBRD.

rates in various types of agricultural production, realization averaged only about 80% of these goals. Limited financial resources, management difficulties, weather, and disease contributed to these shortfalls.

The contribution which agriculture has made to "gross national product" (GNP) has been decreasing every year, going from over 60% in the 1960's to 40% in the mid-1970's. Although production will continue to rise, its contribution to GNP is predicted to drop to 35% by 1980, primarily as a result of rapid growth in other industries such as petroleum production.

The Government has again committed itself to a national plan having 4% to 7% increases in various

types of agricultural productivity. It is beginning to make progress in implementing supportive programs. Although rice production did not reach the goal of self-sufficiency and is not predicted to do so before 1980, intensification programs have been established and have shown significant results both in increased land in cultivation and yield. Seventy percent of the increase in rice production was obtained from land under intensification programs. Rehabilitation programs on the estates have focused on improving crops and modernizing processing. Qualitative as well as quantitative improvements are expected during the current national development plan. Food crop production is projected to increase 21% between 1976

and 1980. Cash crop output is projected to rise over 18% in the same period. Some estimates predict that investment in agriculture will reach nearly \$1.5 billion by 1980.

Cooperatives, which have had consistently higher yields than smallholders, increased 41% in number from 13,349 in 1969 to 18,850 by 1973. Both the number of cooperatives and their membership has continued to rise during the Repelita II period.

The need for technical and financial assistance in agriculture has been recognized by the Government, and it has expressed willingness to work with international agencies as well as foreign investors. Joint projects with these groups have been relatively successful and most foreign investors feel that the Government is genuinely open to new ideas and methods. Government officials have expressed the hope that the number of domestic-foreign joint ventures in agriculture will double in the next 5 years. In addition, international agencies are continuing to budget heavy support for Indonesian agricultural development.

Privately financed agricultural production is predicted to grow at a faster rate than the sector as a whole with several large projects in the planning stages, including a palm oil factory near Medan which, when completed in 3 years, will be the largest producer in the world.

The major question facing Indonesian agriculture is whether financing and technical expertise will be available in quantities sufficient to carry out Government programs. Population growth will continue to cut into gains in agricultural self-sufficiency, and the ramifications of the fiscal problems of the national petroleum corporation, will be felt in the form of budgetary cuts. Programs for the transfer of technology will continue to face the difficulties of working with inadequate educational structures, and of attempting to change centuries-old farming habits and patterns.

One encouraging sign which will lead to growth in the agricultural sector is expansion of national and regional infrastructure. For example, development of Indonesia's road and marine transport systems will open up a wide variety of possibilities in both food and cash crops production for estates and smallholders, as well as providing opportunities for domestic and foreign investors. Infrastructure developments in connection with other industries have already begun to assist agricultural growth. In addition, innovative projects are being planned and built in direct support of agricultural development. For example, plans are being made for a marine transportation system to distribute the production of a feed mill under construction in Ujung Pandang.

There is no doubt that both domestic and foreign markets for Indonesian agricultural products will continue to expand. The country's growing population and rising level of income form the basis for a rapidly expanding consumer market. In addition, the country's proximity to large overseas markets in need of Indonesian agricultural commodities is an important growth factor.

In spite of continued intensive efforts, production increases will not keep pace with rising demands for several years. However, the groundwork laid in the national development plans, and the new opportunities resulting from improved infrastructure, such as better transportation systems and new food processing industries, will provide the foundations for several years of sustained agricultural growth.

MARKET SIZE

Between 1973 and 1974 total Indonesian agricultural equipment sales increased 42% from \$3.9 million to \$5.6 million (see table 7). High growth continued through 1975 and brought total sales to \$7.9 million. Somewhat slower growth continued through mid-1976 and total sales are estimated to reach slightly over \$10 million for the year.

The rapid growth between 1973 and 1975 was the result of rehabilitation expenditures on the part of many of the plantations, both private and government, which were deeply involved in implementing projects begun in early years of the first national de-

Table 7.—Indonesia: Size of Market for Agro-Industry Equipment

(In thousand of U.S. dollars)

	1973	1974	1975	1976	1980
Cultivating Machinery					
Domestic Production	n.a.	n.a.	n.a.	15	75
Imports:					
United States	510	256	504	601	900
Japan	489	980	1,124	n.a.	n.a.
United Kingdom	120	86	168	n.a.	n.a.
West Germany	50	45	80	n.a.	n.a.
The Netherlands	n.a.	25	17	n.a.	n.a.
Italy	n.a.	6	17	n.a.	n.a.
Australia	n.a.	n.a.	17	n.a.	n.a.
Others	60	2	34	n.a.	n.a.
Total	1,229	1,400	1,961	2,016	3,032
Total Market	1,229	1,400	1,961	2,016	3,032
Agricultural Tractors					
Domestic Production	n.a.	n.a.	n.a.	50	100
Imports:					
United States	56	150	290	490	996
Japan	143	250	330	n.a.	n.a.
Taiwan	88	170	300	n.a.	n.a.
United Kingdom	63	110	220	n.a.	n.a.
Netherlands	26	60	400	n.a.	n.a.
West Germany	20	40	95	n.a.	n.a.
Others	190	280	375	n.a.	n.a.
Total	586	1,060	2,010	2,870	5,888
Total Market	586	1,060	2,010	2,920	5,988

Table 7.—Indonesia: Size of Market for Agro-Industry Equipment—Continued
(in thousand of U.S. dollars)

	1973	1974	1975	1976	1980
Harvesting and similar Equipment					
Domestic Production	n.a.	n.a.	n.a.	25	75
Imports:					
United States	194	210	80	380	620
United Kingdom	75	300	225	n.a.	n.a.
West Germany	75	198	150	n.a.	n.a.
Japan	204	150	290	n.a.	n.a.
France	n.a.	130	120	n.a.	n.a.
Australia	35	130	90	n.a.	n.a.
Others	317	602	545	n.a.	n.a.
Total	900	1,720	1,500	2,500	4,130
Total Market	900	1,720	1,500	2,500	4,130
Other Agricultural Machinery					
Domestic Production	n.a.	n.a.	10	15	60
Imports:					
United States	28	66	750	400	952
Japan	460	500	770	n.a.	n.a.
Taiwan	137	150	100	n.a.	n.a.
United Kingdom	82	88	90	n.a.	n.a.
Netherlands	57	60	40	n.a.	n.a.
West Germany	22	24	40	n.a.	n.a.
Others	14	17	25	n.a.	n.a.
Total	800	905	1,825	2,100	3,260
Total Market	800	905	1,825	2,100	3,260
Dairy Related Machinery					
Domestic Production	n.a.	n.a.	n.a.	n.a.	n.a.
Imports:					
United States	29	52	60	70	95
Netherlands	68	82	80	n.a.	n.a.
Denmark	11	30	30	n.a.	n.a.
West Germany	n.a.	10	10	n.a.	n.a.
Japan	n.a.	5	5	n.a.	n.a.
United Kingdom	16	6	5	n.a.	n.a.
Others	7	n.a.	n.a.	n.a.	n.a.
Total	132	185	190	210	300
Total Market	132	185	190	210	300
Other Animal Husbandry Equipment					
Domestic Production	n.a.	n.a.	n.a.	n.a.	n.a.
Imports:					
United States	82	118	124	150	220
Netherlands	71	137	130	n.a.	n.a.
West Germany	4	38	27	n.a.	n.a.
Japan	77	30	74	n.a.	n.a.
Denmark	26	37	40	n.a.	n.a.
United Kingdom	62	12	45	n.a.	n.a.
Others	3	5	6	n.a.	n.a.
Total	325	372	446	536	790
Total Market	325	372	446	536	790
Total Market Size	3,972	5,642	7,932	10,282	17,500

Source: Official Indonesian and supplier country statistics, and estimates based on trade source interviews.

velopment plan. However, by 1976, several projects had been completed and the Pertamina financial problems necessitated reducing Government expenditures on programs previously planned. Between 1976 and 1980, new programs and expansion projects are estimated to result in annual market growth of approximately 14%.

Cultivating machinery, agricultural tractors, and harvesting equipment are items having major sales potential. In 1976, those three categories represented

72% of total equipment sales while dairy farm and animal husbandry equipment constituted a relatively small share.

By 1980 it is expected that the total estimated sales of \$17.5 million will consist of 34% in value of agricultural tractors, 24% of harvesting and similar equipment, 19% of other agricultural machinery such as agricultural pumps, 17% of cultivating machinery, 2% of dairy farm equipment and 4% of other animal husbandry equipment.

Imports

The leading suppliers of agricultural tractors are Japanese and United States firms. Manufacturers from Taiwan, the United Kingdom and the Netherlands also hold good market positions. In mid-1976, Japanese suppliers made 18% of tractor sales, and U.S. companies sold 17%. By 1980 it is expected that suppliers from Japan and Taiwan will increase their market share positions as a result of their penetration of the market with low-cost tractors. The position of U.S. suppliers will remain strong primarily as a result of the introduction of large tractors for use in plantation farming.

American and Japanese firms are also leading suppliers of other agricultural machinery such as pumps and irrigation equipment. In mid-1976, Japanese manufacturers took advantage of their proximity to Indonesia and supplied 38% by value of this agricultural equipment as compared to the 19% share of sales made by U.S. firms. Other countries such as the United Kingdom, Taiwan, and West Germany all had less than 11% of these sales. By 1980 it is expected that the introduction of new irrigation equipment by U.S. firms will increase their market share for such equipment to 29%. The market share of Japanese manufacturers is expected to decrease and it is estimated that shares of suppliers from Taiwan and the United Kingdom will increase.

In sales of cultivating machinery, Japanese suppliers held the leading market position in mid-1976 with a 50% market share, followed by manufacturers from the United States with a 30% market share. It is expected that these positions and shares will be maintained through 1980.

Manufacturers from Japan and the United Kingdom lead in the sales of harvesting and similar equipment with shares of 19% and 15% respectively in mid-1976. U.S. suppliers sold only 5% in value of this equipment. It is expected that Japanese suppliers will increase their market share by 1980, while the increased mechanization on agricultural estates will require large-size American equipment and the U.S. share is expected to rise to 15% in value of harvesting and similar equipment sales.

Domestic Manufacturing

The Government's industrial development programs have resulted in several small agricultural equipment manufacturing projects, and there are some Indonesian firms producing limited amounts of agricultural and irrigation equipment.

P.T. Pusri, a fertilizer factory, has entered into a joint venture with a Japanese firm to produce hand sprayers for use with insecticides. Capacity is projected to be 120,000 sprayers the first year, 180,000 the second, and increasing to full production of 600,000 in the fifth year.

P.T. Kubota Indonesia, Semarang, Central Java, is a joint venture between P.T. Kubota Ironworks, Kinsho-Mataichi (Japan), and P.T. Garuda and P.T. Quick (Indonesia). The firm began production of diesel engines in 1973 and expanded to produce power tillers in 1974 and farm tractors in 1975. The production level was 30 power tillers and 50 tractors in 1975, and is planned to expand to 500 power tillers and 150 tractors in 1977 as well as the manufacture of other basic agricultural equipment such as rice-hulling machines.

There are two State-owned machine shops, which produce crushers, milling equipment, and centrifuges for use in the sugar industry: P.T. Barata in Surabaya, and P.T. Boma Stork in Pasuruan, East Java, which began manufacturing sugar milling equipment and spare parts in 1974. P.T. Boma Stork is owned by Bina Usaha (Bank Indonesia) with 14% ownership, the Department of finance, 51%, Stork-Werkspoor, 20%, and P.T. Masayu/Kiagoos, 15%.

P.T. Tri Usaha Bhakti, the Indonesian military holding company in Jakarta, is planning to establish a plant in Bandung to produce sugar industry equipment and machinery.

The Indonesian Government is also seeking United Nations (UNDP) assistance for domestic manufacturers of threshing and tilling equipment. There are no Indonesian exports of agricultural equipment.

MARKET OPPORTUNITIES

Agricultural estates, both government and private, offer the major market for sales of agricultural machinery. In addition, several of the larger, well-established cooperatives have begun making some equipment purchases, and with the increasing support and financial credits available from the Government and international aid programs, cooperative purchases should begin to increase considerably. Owners of medium-sized plots, averaging about 6 hectares, on the outer islands are becoming interested in mechanization, and a growing network of sales and service contractors provide a new base for equipment sales to this market.

Due to the availability of low cost labor and the Government's emphasis on employment, certain agricultural activities such as planting and harvesting will remain highly labor intensive for many years. There is some use of mechanical cutters in the sugar industry, but plot size and plant rotation methods have kept even lands rented by the large estates from being effectively mechanized. The same situation exists in use of materials handling equipment for agricultural commodity processing and storage. For example, many of the largest rice mills do not use forklift trucks. Some of the newer processing operations are beginning to use mechanized handling methods and are reportedly very satisfied. The new Bogasari Flour Mill in Surabaya is using a vacuator and conveyer belt system with a scoop truck loader. Bagged flour is moved by forklifts. If these methods can be demonstrated to be cost-effective, other firms will be interested in purchasing similar systems for future expansion plans. Examination of government programs and private agricultural projects reveals several agricultural equipment sales opportunities.

As new plantations are opened on the outer islands, sales of ground preparation and cultivating equipment will increase. The establishment of these new estates will require purchases of various types of earthmoving equipment such as tracked loaders, bulldozers, and dumpers. The development of swamp land, which is included in several government projects, and the planned expansion of irrigation systems will require large quantities of ditchers and pumps. By the end of the current national plan in 1979 new estate development will result in increased sales of large tractors. Sales of cultivating and accessory machinery are not expected to rise as fast, however, because of the tendency to use imported tractors in combination with low cost locally produced plows and harrows.

In addition to large estates and major ground clearing projects, there are three other important market opportunities for tractor sales.

First, many smallholders on the outer islands have land holdings of sufficient size to utilize tractors in the 14 to 27 horsepower (hp) range. Available government credit programs will cover purchases of such relatively low cost tractors. On South Sulawesi 80,000 hectares of smallholder land is already mechanized for land preparation purposes. Many of these smallholders began mechanization a few years ago with 14 hp equipment, but recent sales indicate that replacement purchases will be in the 25-30 hp range. There are an additional 120,000 hectares under cultivation in South Sulawesi alone which are suitable for similar mechanization.

Secondly, owners of moderate size operations, primarily on Sumatra and Sulawesi are interested in

machines in the 47, 62, and 75 hp range. However, equipment often stands idle due to a lack of the expertise which would permit full utilization of equipment capabilities. On one farm in South Sumatra, for example, feasibility studies showed the need for 20 tractors which were subsequently purchased. Only eight of the machines are presently being used, and there is need for technical assistance to develop their full use.

A third market opportunity for tractor sales is to the growing number of service contractors. A recent development in Indonesia, service contractors purchase agricultural equipment and do land preparation for local farmers. Less than 100 such contractors were operating in 1976, but equipment sales personnel are looking for a rapid increase in this number. It is expected that between 500 and 1,000 service contractors will be operating in 2 to 5 years. Purchases have been in the 90 to 150 hp range, and one supplier is introducing a new 92 hp tractor with sales promotions focused on this market.

The need for agricultural storage facilities is mentioned in almost every development expansion plan regardless of the commodity. Tank-type storage facilities are needed for palm and coconut oil as well as for rubber latex. Concern for pest control has caused government officials to express interest in alternative methods of rice storage. Projected growth in the cattle industry will open the market for feed storage facilities. Transmigration and agricultural expansion in the outer islands will provide the opportunity for sales of mobile storage/transport equipment such as tank trucks. New agricultural commodity storage facilities for marine transport will also be required.

Since it is often easier to obtain financing and assistance for large-scale agricultural projects, sales of processing equipment will probably continue to be dominated by contracts for entire plant engineering and construction. The major opportunities will be in connection with the six sugar mills still to be constructed, and rehabilitation of the palm oil industry. Government agricultural officials also express interest in purchasing complete poultry farm operations, both for egg and broiler production.

Agricultural goals set in the current national development plan will require a large amount of technical assistance in every aspect from field work through processing and marketing.

Government programs call for intensification in methods of pest control and disease eradication for both crops and livestock, crop diversification, increasing yields, and methods of raising improved seeds. One proposal of the Department of Agriculture calls for a pilot seed demonstration project which would lead to domestic production of high

quality seeds. Another area of expressed interest is developing a system for field ginning of cotton. Swamp development agricultural projects will also require experienced advisory personnel.

Technical assistance is needed in estate management and marketing techniques as expansion plans push production and administrative systems beyond present capacities. With the Government's emphasis on increasing employment, estate managers express keen interest in improving manual farming methods and making more effective use of personnel. There is also a need for technical assistance in managing agricultural cooperatives including all aspects of organization, field work, equipment purchasing, processing, and marketing.

IMPORT PROCUREMENT

Buyers Universe

There are three major buying groups in Indonesian agriculture: the Government, estates and other agricultural business enterprises, and smallholders.

Government buyers are in three major categories: Government-owned plantation estates, government-managed cooperatives, and government-administered transmigration projects.

Although the budgets for State-owned and operated plantation estates (PNP's) are controlled by the office of the Directorate-General of Estate Crops, purchasing decisions are made by the individual manager of each estate. It is therefore necessary in sales development to approach each manager individually, become acquainted with his production problems, and assist him in planning both purchase and effective use of agricultural and basic processing equipment.

The State-owned plantations established as limited liability corporations (PTP's) are independent with regard to both budgeting and equipment purchases. In making sales proposals to this group it is also necessary to contact each estate manager or director.

Budget planning for both government-administered cooperatives and transmigration projects provides a relatively small amount for equipment purchases, but it has generally not been used because the subsistence level of farming in these programs and the low technical skills of the farmers has precluded major purchases of equipment.

Sales proposals for the cooperatives should be made to the Directorate-General of Cooperatives, and for transmigration projects to the Directorate-General of Transmigration, both located in Jakarta.

The Government also works closely with several international assistance agencies on a variety of agricultural projects. For these projects the Government normally purchases equipment by international tender bidding under the auspices of the international assistance agency. In making international project related sales, it is therefore necessary to discuss the project both with international assistance agency representatives to learn equipment specifications, and with the government project manager to determine purchasing procedures.

The Government has also contracted with consulting firms to do specialized agricultural studies such as the Bookers Agricultural and Technical Services, Ltd., (U.K.) and Tate and Lyle Technical Services Ltd. (U.K.) to do a detailed study of the sugar industry. Another special research project for the livestock industry is being done by a New Zealand consulting group.

There are four major private agricultural equipment purchasing groups in Indonesia: private estates, agricultural businesses, moderate size farms, and service contractors.

In addition to the mass of subsistence level smallholder plots, there are many privately owned estates and a growing number of moderate sized farms. The majority of these operations are heavily labor intensive. Contacts for equipment sales should be made directly with owners/managers who are responsible for all purchasing decisions. Financing is crucial in sales to the majority of this group, and technical advice is necessary to expand the buyer's concepts of equipment usage.

Service contractors, who contract with local farmers in their area for land preparation, are a new market in Indonesia which is expected to grow rapidly. Present contractors are usually affiliated with a particular manufacturer but may be approached directly for sales of additional equipment and implements.

Private estates and agricultural ventures involving foreign investments are presently the most highly mechanized group in Indonesian agriculture. Most of these ventures have both an onsite manager and a coordinating office in Jakarta, as well as an office in the home country of the foreign investor. Most purchasing decisions are made by the onsite manager, but major purchases often must be cleared with the other two offices. In some cases equipment is purchased directly by the home office.

Foreign Suppliers Universe

Agricultural equipment of many nations and a wide variety of vintages is available in Indonesia, although a small number of brands maintain leadership positions. Due to the extensive role played by

multinational corporations in agricultural equipment supply, brand names do not necessarily identify country of manufacture. Companies such as International Harvester, Caterpillar, and Ford supply agricultural equipment from assembly plants in the United Kingdom, Australia, Germany, France, Canada, and Mexico, and from joint venture operations in Japan. There are approximately two dozen sales representatives centered on Java, primarily in Jakarta, but also in Bandung, Semarang, Medan, and Yogyakarta, with combination sales outlets and service centers scattered through the outer islands.

Several exclusive sales representatives and a multiple franchise dealer as described below, are responsible for the majority of sales of agricultural equipment in Indonesia.

P.T. Trakindo Utama, the Caterpillar dealership, is reported to make well over 50% by value in sales of heavy duty equipment for ground clearing, irrigation, construction, and related agricultural use. The firm is known and respected for its system of sales and service outlets throughout the country, which includes advisors who travel widely working with Indonesians in the field to handle problems and expand equipment usage.

P.T. Geveke was originally a Dutch firm and has been operating in Indonesia for over 40 years. During this time the management has been able to develop solid working relationships with many Indonesian agricultural leaders and has close ties with the government-owned plantation estates and their purchasing offices. P.T. Geveke carries a wide variety of European equipment lines including Honomag (Germany), Marshall-Fowler (United Kingdom), and Richard-Continental (France).

Other leading sales representatives are Komatsu Ltd. (Japan) which is viewed by many as Caterpillar's main competitor in the agricultural heavy equipment field, and P.T. Altrak, the agent for Fiat-Allis (Italy and the United States). P.T. Traktor Nusantara, the Massey-Fergusson dealership, and P.T. Mesintani, which handles International Harvester agricultural and industrial equipment, have both been increasing their sales promotional efforts in recent years, and agricultural equipment sales now account for almost 40% of P.T. Traktor Nusantara's total business.

There are four companies, all located in Surabaya, who specialize in supplying the equipment needs of the sugar industry: P.T. Ometraco which represents Fletcher and Stewart (U.K.), P.T. Aneka Djaja Tjipta which carries several lines of U.S. and European equipment, P.T. Gruno Nasional which represents International Combustion Ltd. (U.K.) and P.T. Mandiri Wijaya which was established in 1974 by retired members of the government-owned plantation management staff. This latter firm is reported

to have excellent sales contacts with officials of the government-owned estates and the Joint Sugar Project management.

Agricultural equipment supplied by Japanese manufacturers is often lower priced than that from United States or European suppliers and usually comes with better credit terms. The smaller sizes and simplified operation of Japanese equipment have resulted in growing sales to moderate-sized farms, but its light construction has presented problems in the rough terrain on large agricultural estates.

Long Indonesian affiliations with Europe have established solid business ties, and familiarity with the operation of equipment from European suppliers has led to continued sales.

Agricultural machinery from China and Taiwan is sold in Indonesia primarily because of its low cost and almost immediate availability.

The major suppliers sell through exclusive sales representatives or franchise distributorships with stock items maintained in Indonesia. Both stock and special order items are usually shipped directly from the country of manufacture or assembly, which, in the case of agricultural equipment, is often not the home country of the supplier firm. Singapore and Hong Kong are not utilized as heavily for agricultural equipment stock backup as is the case for other types of machinery, but technical and sales personnel often operate out of regional headquarters in those cities.

Marketing Factors

Although price is an important factor, quality is becoming more important. Most agricultural equipment users are now paying higher prices for machinery suited to their particular needs. Most equipment suppliers provide financial assistance to their sales representative in the form of consignment shipping and extended credit. The sales representative is then responsible for arranging credit terms with the customer. A 2-year buyer loan is common for equipment sales in the moderate range, such as the purchase of a tractor.

Delivery times are an important factor in equipment sales, but have not been a major problem. Most suppliers have ample stocks of basic items in or near Indonesia, and customers expect to wait for special order items. However, delays for reasons which customers consider unnecessary have caused difficulties. An example of this is the lengthy credit clearance procedures practiced by some suppliers.

With regard to warranties, spare parts and service, the competition in the market and high standards established by the leading suppliers have led the customer to expect that pre-sale technical consulta-

tions and after-sales assistance are part of any equipment purchase, and that spare parts will be readily available in Indonesia. Sales representatives of the leading firms have consistently attempted to live up to these expectations. For some of the lesser known brands of agricultural machinery, such as those from the Peoples Republic of China and Taiwan, Indonesians have shown considerable ingenuity in fabricating spare parts.

Established representation is essential for sales of agricultural equipment, and a manufacturer must be willing to back up a representative with financial assistance in the form of consignment shipping and adequate stocks of spare parts, as well as with technical assistance in the form of training for the representative.

Sales proposals which involve government projects require taking the time to establish relationships and credibility with Indonesian officials, and representation that guarantees follow-through after initial presentations.

Onsite demonstration is probably the most effective agricultural equipment sales method in Indonesia. An example of innovative marketing by onsite demonstration is the program recently developed by P.T. Mesintani to increase sales to service contractors. P.T. Mesintani has developed a half-day field demonstration which is being shown throughout Indonesia in areas where service contractors are establishing their operations. The demonstration is often advertised by the village officials and/or through the use of a small car with a loudspeaker. The villagers have reacted enthusiastically and P.T. Mesintani is considering adding an afternoon session through the use of specially designed films.

In the case of large government and international assistance programs such as agricultural commodity processing and sugar mill projects, technical seminars and equipment demonstrations—aimed at decisionmaking officials—have proved to be very effective sales promotion methods.

There are two general agricultural associations. The Indonesian Farmers Association which is headquartered in Medan, North Sumatra, and Yayasan Pengembangan Usaha Tani Indonesia (The Foundation for Indonesian Farming Development), both of which are relatively small but should be contacted for developing agricultural equipment sales. There are also a few other associations related to Indonesian agriculture. Gabungan Produsen Karet Indonesia (The Rubber Producers Association of Indonesia) has an office at Jalan Musium, 2, Jakarta. "Assosiasi Perdagangan Makanan Ternak Indonesia, (INAFETA, Indonesian Animal Feed Trade Association), has its main office at Jalan Kramat

Raya, 4-6, Jakarta. The Food Technology Association in Jakarta holds seminars for the food industry, and the Indonesian Sugar Producers Association in Surabaya assist its members with production and marketing research.

COMPETITIVE POSITION OF U.S. SUPPLIERS

For many years most American agricultural equipment was technically beyond Indonesia's needs but as the country's agriculture develops, U.S. technology and suppliers are becoming competitive in the market.

One representative of an American manufacturer summed up his feeling of sales optimism with the statement, "We compete on quality." Equipment from U.S. firms is respected for its durability and dependability in spite of its use on rugged terrain and often by inexperienced operators, and in several instances for its multiple usage capabilities.

American machinery reflects vast experience in large-area farming, a factor which is considered in estate rehabilitation and expansion projects. Some American equipment, however, is still considered too large and high powered for Indonesian agriculture.

Use of harvesting and field processing equipment is minimal in Indonesia. Although the government's employment policy is a major factor in limiting growth in sales of this equipment, poor experiences with machinery not adapted for Indonesia, or supplied without sufficient technical assistance have also been limiting factors. American technical advisors often have direct farming experience and are recognized for their practical knowledge and willingness to get involved in field work.

During the first national development plan in the early 1970's as several agricultural mechanization programs began, there was a tendency to consider price as the major criteria for equipment purchases. Frequent breakdowns have largely changed this practice and salesmen report that there is now a trend to upgrade equipment, a fact that will im-

prove the competitive position of American machinery.

American manufacturers are criticized by Indonesian agriculture specialists for their late entry into the market and general lack of permanent representation.

Delivery factors present problems for U.S. agricultural equipment suppliers in terms of both time and cost. Shipments from the United States generally take twice as long as the same shipment from Japan, and freight charges can add 25% to 50% to the cost of the item.

In financing, it is generally considered that U.S. suppliers do not provide competitive terms, and that they have not been able to assist potential purchasers in locating sources of credit.

For the next several years, technical assistance in nearly all fields will be the greatest need of Indonesian agriculture. For successful market development it will not be sufficient to have an agricultural engineer stationed in a Jakarta office waiting to be called for technical advice. Rather, qualified sales representatives should be selected, and all sales personnel trained and willing to work with owners and managers in solving agricultural problems.

Agricultural equipment suppliers should search out and create opportunities for technical assistance. Many such opportunities either include possibilities for immediate equipment sales or create a market for sales in the near future.

Suppliers may also increase sales by participation in educational programs, both formal and informal, through which the Government is attempting to increase agricultural production. Specific suggestions for participation include assistance in curriculum building, and presenting field demonstrations on the government's intensification projects.

American firms interested in providing services and/or selling equipment in Indonesia should take the time to become knowledgeable in international and Indonesian financing in order to use available funds more effectively to assist prospective purchasers. For example, suppliers should be aware that credit for equipment purchases is available to cooperatives and smallholders through the Bank Rakyat Indonesia.

Chemical Industries

Indonesia's chemical and pharmaceutical industries have developed rapidly in recent years. Petrochemical production has grown more slowly despite the fact that nine petroleum refineries are now operating in the country.

Almost all equipment is imported. Domestic production consists primarily of the assembly and fabrication of simple steel vessels and tanks. Good sales opportunities exist for U.S. suppliers of plant components as well as complete plants. There are also opportunities to provide consulting and construction engineering services as well as the licensing of chemical process technology.

Indonesia's total imports of chemical, petrochemical, and refinery processing equipment are expected to increase from \$50 million in 1975 to about \$110 million by 1980.

American suppliers occupy a strong position in both equipment sales and consulting services. U.S. engineers and contractors play significant roles in plant design and construction, and Indonesians show a strong preference for American plant equipment.

Strong competition will require that U.S. suppliers pay close attention to financing terms, delivery times, pricing, freight costs, and after sales service if they are to maintain their market position. U.S. exports also could be increased through a more active sales approach to foreign consulting and contracting engineers working in Indonesia.

STRUCTURE AND SIZE

Petroleum Refining

Pertamina, the national petroleum corporation, controls all petroleum refining and natural gas processing operations in Indonesia. In previous years Shell, Caltex, and other foreign firms operated refineries; of nine refineries, five are on Sumatra at Sungei Gerong (50,000 barrels per day—bpd), Pladju (100,000 bpd), Dumai (100,000 bpd), Sungei Pakning (50,000 bpd), and Pangnalan Branden (4,000 bpd); three are on Java at Surabaya (4,000 bpd), Semarang (4,000 bpd), and Cilacap (100,000 bpd); and one is on Kalimantan at Balikpapan (75,000 bpd). In addition

the Government's oil and gas research and training institute (Lemigas) operates a refinery with a 4,000 bpd capacity. Pertamina also contracts with refineries located in Singapore to process crude oil on its behalf. Total Pertamina refined petroleum product output, including both domestic and foreign contracted processing, was in excess of 113 million barrels in 1975, a 36% increase over 1970. It is expected to approach 175 million bbl by 1980.

Fuels produced domestically by Pertamina include aviation gas, turbine gas, gasoline, kerosene, automotive diesel oil, industrial diesel oil, and fuel oil. Other products include naphtha, white spirits, superbenzene, solvent, jute batching oil, coke, waxes, lubricating oil, and asphalt.

During 1975 Pertamina opened a lubricating oil blending plant at Surabaya, East Java. The plant, designed to produce automotive lubricants, is planned to have output of 150,000 drums annually.

Domestic refinery output was 82.3 million barrels (bbl) in 1975 (see table 1) down 16% from 1974's 97.8 million bbl. This decline was a result of decreased crude oil production reflecting international market factors.

In 1975 the Singapore-based refineries of Shell, Mobil, and others processed about 31 million barrels for Pertamina. The domestic refineries of Pertamina exported 32 million barrels of refined products in 1975. In addition, Pertamina contracted to Singapore refineries for production of 5 million barrels of refined products.

Most of the Indonesian refineries are old. The most modern are the Sungei Pakning and Dumai refineries completed in 1971 and 1972 respectively. In September of 1973 Pertamina officially opened a 6,200-bpd platforming unit at the Dumai refinery. The project was financed by Japanese firms to produce high octane gasoline and reformat for export to Japan to be processed into high octane benzene.

On August 24, 1976, President Suharto officially opened Pertamina's new 100,000 bpd refinery at Cilacap, Central Java. The facility is located next to the Donan River, north of the town of Cilacap, about 4 miles from the coast. Design and procurement were carried out by the Fluor Corporation (U.S.). Another Fluor subsidiary, Fluor Eastern, performed the ac-

Table 1.—Indonesia: Refining Output—1975
(in 1,000 barrels)

Domestic Fuel	46,761.8
Aviation Gas	179.4
Turbine Gas	564.2
Gasoline	11,221.8
Kerosene	13,566.8
Automotive Diesel Oil	11,478.0
Industrial Diesel Oil	4,093.1
Fuel Oil	5,658.5
Other Products	32,042.0
Naphtha	505.4
Waxy Residue	30,658.1
Petrochemical Gasoline	13.6
White Spirits	0.4
Superbenzene	0.1
Solvent	184.8
Jute Batching Oil	19.3
Liquid Petroleum Gas	336.2
Coke	200.6
Residue	123.5
Byproducts	640.7
Waxes	283.8
Asphalt	326.2
Lube Oil	30.7
Other	2,817.2
Intermediates	1,939.3
Fuel Gas	871.1
Losses	6.8
TOTAL	82,261.7

Source: Pertamina

tual construction which began in 1974. Project financing for the \$310 million refinery was undertaken largely through syndicated loans managed by the Citibank Bank Corp. The U.S. Export-Import Bank contributed a loan of \$54 million to cover project costs. Local financing was supplied by the Central Bank and Pertamina.

The new refinery features a basic four train product line consisting of gasolines, distillate fuels, lube oils, bitumens and residual fuels. The bulk of the refinery's output, 34%, will consist of industrial fuel oil. Kerosene, the most widely consumed petroleum product in Indonesia, will make up 20% of the refinery's final product. Gasolines will represent 15% of the total refinery product while diesel oils will be 22%. The remainder of plant product will be asphalts, bitumens, and lube oils.

The fuels plant features a 22,000 bpd napha hydrotreater and a 12,000 bpd platforming unit for producing super and regular gasolines. The refinery contains a merextreating sweetner unit for processing about 20,000 bpd of kerosene. Middle distillates will be produced via an 18,000 bpd hydrodesulfurizing unit.

Other key elements include the lube oil and asphalt processing facilities, not found on any of the other Indonesian refineries. The Cilacap refinery will produce about 3,200 bpd of asphalts and other bitumens plus about 1,600 bpd of lube oils.

Crude will be obtained initially from the Middle East and from the northwest offshore Java Sea Ardjuna field on an 80/20 basis. Eventually, a

larger share of local crudes will be used. Imported crudes must be employed for the production of lube stocks and bitumens which cannot be refined from the local, paraffin-base crude. The first charge for the refinery startup came from delivery of Arabian light crude.

Terminal facilities consist of a shipping pier which can accommodate vessels up to 3,000 dead weight tons (dwt) and a crude/product jetty for loading and unloading vessels up to 35,000 dwt. Additionally, Fluor has designed an island loading terminal which can handle tankers up to 135,000 dwt. Several refinery end-products will be distributed throughout Central Java via the existing Cilacap-Maos-Yogyakarta pipeline as well as the Cilacap-Bandung pipeline.

The new facility boosts total rated refining capacity almost 24% to 527,000 bpd. However, since most of Indonesia's refineries are several years old, Cilacap's output actually represents about 45% of effective refinery capacity. The new project relieves a costly dependency on imported lube oils and asphalts by allowing Indonesia to become virtually self-sufficient in these products.

Petrochemicals

The only petrochemical enterprise currently in operation in Indonesia is Pertamina's polypropylene plant at Pladju, South Sumatra. It has a production capacity of 20,000 tons of polypropylene annually. It utilizes a homopolymer process licensed from Phillips Petroleum of the United States.

The \$1.7-billion proposed olefin complex now under serious consideration by the Indonesian Government would be built by Dow Chemical in North Sumatra near the Arun natural gas fields. The complex would utilize natural gas as feedstock to produce a minimum of 300,000 tons per year of ethylene, high and low density polyethylene, and other intermediates. Dow Chemical foresees completion in 1980.

Natural Gas Liquefaction.—One of the most exciting developments in Indonesia's petrochemical industry is the plan to utilize natural gas. In the past it has been left in the ground or flared into the atmosphere during petroleum extraction. Indonesia's fertilizer industry already makes some use of natural gas, but new facilities under construction will liquefy it so that it can be exported.

Pertamina is involved in two major LNG projects, one at Mobil's Arun field in Aceh Province in North Sumatra and the other at Roy Huffington Company's Badak gas field in East Kalimantan. The Arun field reserves are estimated at 17 trillion cubic feet, and the Badak field at 7 trillion cubic feet. Pertamina has signed major contracts with Japanese utility and industrial companies for delivery of 7.5 million tons

of LNG annually for 20 years (equivalent to almost 200,000 bpd of crude oil). Deliveries are scheduled to start in mid-1977. Pertamina also is negotiating with the Pacific Lighting Corp. of Los Angeles, Calif. for delivery of 3.5 million tons of LNG annually starting in 1979. In addition to producing LNG, the Arun facilities also will supply condensate, a process byproduct, for use in petrochemicals and fuel. The Badak gas analysis shows over 87% methane, 10% other hydrocarbons, less than 3% carbon dioxide, and no sulfur.

Pertamina expects the Badak plant to be completed in 1977. The plant is designed to operate initially with two LNG trains and later to expand to four trains. The first two trains will have a combined charge rate of 530 million cubic feet of gas per operating day, producing about 3.3 million tons/year of sulfur-free LNG.

At the Arun plant the gas and condensate will be separated in the field and then transported by individual pipelines to the LNG plant. Eventually there will be four producing clusters at the field site. Production of condensate liquids will start in mid-1977 or early 1978 at one of the four clusters. At the liquefaction site, the long-range plan calls for six LNG trains, each having a capacity of 200 million cubic feet per day. Initially, only two trains will be built. Total cost for both projects, including field processing and terminal operations, is estimated at about \$2 billion.

U.S. firms have been deeply involved in planning and construction of these LNG projects. Design and construction work at both Arun and Badak is being done by Bechtel Engineering Corp. The process uses advanced technology developed in the United States. Upon arrival at the LNG plant, the gas is processed to remove inert gases, mercury and water, and then liquefied by cooling to ultra-low temperatures in MCT towers built by Air Products Corp. of Pennsylvania. The condensate is stabilized and combined with additional condensate produced from the LNG process. The LNG and condensates are then stored, and later loaded separately into tankers for export or for later processing.

In addition to the Arun and Badak LNG projects, Pertamina is planning other natural gas projects. The country's first offshore processing facility is off the coast of Java at the Arco field. The \$150-million plant, built by Fluor, will extract and liquefy propane from natural gas which would normally be flared. The remaining gas will then be spiked into the crude oil stream to improve crude quality.

Union Oil is building a \$40-million crude stabilization and gas processing facility at Santan, East Kalimantan, using 10,000 bpd of oil and producing ethane and propane.

Agricultural Chemicals

Total consumption of fertilizer in Indonesia in 1975 was about 1.4 million tons of which 230,000 tons were produced domestically.

Two firms in Indonesia produce fertilizers, both are government owned. P.T. Pupuk Sriwijaya (referred to as P.T. Pusri) produces urea fertilizer at its two-unit complex in Palembang, South Sumatra, using natural gas as feedstock. The firm was established in 1959 and construction of the first unit, Pusri I, started in 1961 with U.S. Agency for International Development, World Bank, and Japanese (OECD) funds. The 100,000-ton capacity plant was completed in 1963 at a cost of \$43 million. Construction of the second plant, Pusri II, was completed in 1974 at a cost of \$86 million. The second unit's production capacity is 380,000 tons of urea annually.

To augment the two plants, a third unit (Pusri III) with a 570,000-ton capacity will start production in 1977. Pusri IV is not yet under construction. It will be completed in 1978 or early 1979 with a designed annual capacity of 570,000 tons of urea.

The four plants combined will give Pusri a total urea production capacity of 1.6 million tons per year.

Pusri is also planning to build a diammonium phosphate (DAP) plant in 1977 with a production capacity of 320,000 tons per year. Ammonia for this proposed plant can be supplied by the existing Pusri plants, but phosphate will have to be imported.

The second government-owned firm producing fertilizer is P.T. Petrokimia Gresik, located near Surabaya in East Java. Petrokimia Gresik produces urea and ammonium sulfate, using petroleum feedstock. Production capacity of the Italian-built plant is 45,000 tons per year of urea and 150,000 tons per year of ammonium sulfate.

Uses of fertilizer vary throughout the country. Use of fertilizer on large plantations producing rubber, palm oil, and other crops, is evenly divided among nitrogen, phosphorus, and potassium types; in food crop farming, nitrogen and phosphorus fertilizers are more widely used than potassium types. The unbalanced use of fertilizers on food crops reflects the pattern of small agricultural operations aimed at meeting subsistence requirements.

Government policy calls for rapid expansion in fertilizer production by the end of the current national development plan in 1979. Plans include the use of Indonesia's natural gas resources to develop a major fertilizer industry that can supply both local needs and also permit fertilizer exports. Petroleum and naphtha could be used for aromatic (BTX) petrochemicals, and natural gas would be used for production of nitrogen fertilizer as well as for olefinic petrochemicals. In addition to an increase in nitrogen

fertilizer output, plans call for development of a phosphate fertilizer industry.

Fertilizer plants scheduled for completion during and after the period of the current national plan are shown in table 2.

Table 2.—Indonesia: Planned Fertilizer Plants

Project	Product	Annual Capacity (1,000 tons)	Completion Date
Pusri III	Urea	570	1976/77
Pusri IV	Urea	570	1977/78
Pusri DAP (conversion) ..	DAP	320	NA
Pupuk Kujang	Urea	570	1978/79
Kaltim I	Urea	570	1982/83
Petrokimia Gresik	TSP	330	1978/79
	DAP	80	1978/79
	NPK	50	1978/79
Aceh I	Urea		1985/86
Cilacap	TSP	400	NA

Source: Director General of Chemical Industries, industry sources.

Development programs underway will bring annual production capacity by the end of the plan in 1979 to:

Urea	2,200,000 tons
ZA (ammonium sulfate)	150,000 tons
TSP (triple superphosphate)	330,000 tons
DAP (diammonium phosphate)	80,000 tons
NPK (nitrogen, phosphorous, and potassium)	50,000 tons

Petrokimia Gresik has already started construction of a TSP, DAP, and NPK plant with a 460,000-ton annual capacity. That plant is scheduled for completion by 1979.

The Java south coast, Cilacap area, has been selected as the site for construction of another TSP factory with a 300,000- to 400,000-ton annual capacity. It would incorporate the partially completed facilities of a Soviet-sponsored fertilizer project where construction was halted in 1966. The equipment delivered for the original plant is now obsolete or in deteriorated condition.

The Indonesian Government is constructing a new fertilizer plant, P.T. Pupuk Kujang, near Cikompek (about 120 km from Jakarta) on Java. This plant will use natural gas piped in from the offshore Arjuna field and will be designed to produce 570,000 tons of urea per year.

Another government-planned plant evolved from a now-terminated project to build a floating 360,000-ton urea plant. The original project was contracted for in 1974 by Pertamina with Coppee-Rust S.A. of Belgium, I.P.I. Contractors S.A. of Switzerland, and Lurgi of West Germany. The new plant P.T. Kaltim, will be built at Muara Badak in East Kalimantan. It will use gas feedstock piped in from offshore fields. Expected annual production capacity is 570,000 tons

of urea and 165,000 tons of ammonia. Plans for this project are again undergoing revision and it may not be completed until 1983.

Government plans also include an Association of Southeast Asian Nations (ASEAN) urea plant at Arun, North Sumatra, using gas feedstock from the Arun field. In 1976 the ASEAN nations agreed to the establishment of urea plants in both Indonesia and Malaysia to serve member nations. A market survey is being undertaken for product distribution from a 570,000-ton urea plant at the Arun site.

Indonesia could become a major supplier of nitrogen fertilizer to Asia by 1978 and could easily and profitably serve the ASEAN market on almost any terms. The country is in the middle of an expanding market, has relatively easy access to cheap natural gas, and can readily ship by marine transport.

The long-range prospects for fertilizer export from Indonesia are good. The price of oil and naphtha are rising significantly compared to the price of natural gas, so countries with fertilizer industries based on those feedstocks will face difficulties in the future. Meanwhile, countries such as Indonesia which have natural gas resources will be in a relatively advantageous position.

As for other agricultural chemicals, foreign firms have started formulation plants for insecticides and herbicides. At present there are four such firms in Indonesia: Dow Chemical, Imperial Chemical Industries (ICI), Union Carbide, and Bayer. The Dow plant, P.T. Pacific Chemicals, is located in North Sumatra near Medan. It manufactures herbicides for use on rubber and palm oil estates. Approximately \$8 million was invested in the plant of which about half was for equipment. The firm plans to expand its range of products from herbicides to include insecticides. This expansion will cost \$1 million and is scheduled for completion in 1978.

Petrokimia Gresik is planning to build a \$6-million plant for production of insecticides in a joint venture with Japanese interests. The plant is projected to produce 460,000 tons of insecticides per year by 1979.

Union Carbide of the United States is planning to invest \$3 million in an insecticide plant in Surabaya, East Java. The plant, to be called P.T. Agrocarb Indonesia, will have a capacity of 13,000 tons per year of pesticides or insecticides.

Cement

The Indonesian cement industry has grown very rapidly in recent years. In 1974, with only three State-owned plants in operation—P.T. Semen Gresik, P.T. Semen Padang, and P.T. Semen Tonasa—production totaled 840,000 tons. In 1975 two new

plants involving private capital, P.T. Semen Cibinong and P.T. Indocement Indonesia, began operations adding a total combined production capacity of 1 million tons annually.

The current national development plan calls for further expansion of all these plants and construction of new ones for a total capacity estimated as high as 7 million tons per year by 1979. Since local demand for cement is expected to total about 4.4 million tons per year in 1979, Indonesia could well become a cement-exporting nation.

Table 3 depicts the projected development of the cement industry throughout the remainder of the decade. The largest of the new plants, known as Indarung, a joint venture of Semen Padang and a private firm, is to be located near the existing Semen Padang plant at Indarung in West Sumatra. P.T. Semen Cirebon, is a joint venture between P.T. Sahid International and Holderbank Financiere Glarus of Switzerland. P.T. Semen Nusantara, is a joint venture between the domestic firm P.T. Gunung Ngadeg Djaya and two Japanese firms, Onoda Cement Company and Mitsui Company. P.T. Semen Baturaja is owned by two of the State-owned companies, Semen Gresik and Semen Padang; the Asian Development Bank has committed funds for this plant.

Other Chemicals and Chemical Products

Other chemicals produced in Indonesia in addition to the categories already discussed include industrial gases such as oxygen and carbon dioxide, salt, soap, surfactants, paint, caustic soda, sulfuric acid, hydrochloric acid, and chemicals used in the textile industry. Indonesian consumption of chemicals and pharmaceuticals in 1974 exceeded a value of \$465 million. Domestic production, primarily pharmaceuticals, accounted for about \$108 million of this figure (see table 4).

Pharmaceuticals.—There are approximately 160 pharmaceutical manufacturers in Indonesia. With the exception of the largest, P.T. Kimia Pharma, the government-owned pharmaceutical producer, most of the major firms are foreign owned or foreign joint ventures. Included among the 30 leading foreign firms or joint ventures are Dumex, Roche, Hoechst, Pfizer, Carlo Erba, Squibb, Ciba-Geigy, Bristol Myers, Bayer, Warner-Lambert, Schering, Parke-Davis, Wyeth, Rhodia, Organon, Natterman, Richardson-Merrell, Hudson, Merck, Sharpe and Dohme, Johnson and Johnson, ICI, Upjohn, Medifar, Eisai, Tanabe, Takeda, and Abbott. Sales of pharmaceuticals totaled \$114 million in 1974. Sales growth averages 20% to 25% per year. Per capita consumption has been estimated at between \$1.20 to \$1.30 annually.

Table 3.—Indonesia: Development of the Cement Industry

Plant	Location	Total planned capacity	Completion date
P.T. Semen Gresik	East Java	1,500,000	1978/79
P.T. Semen Tonasa	West Java	620,000	1980
P.T. Semen Padang	Sumatra	330,000	1976/77
P.T. Semen Cibinong	West Java	1,200,000	1978/79
P.T. Indocement	West Java	1,000,000	1976/77
P.T. Indocement Indonesia	Sumatra	1,000,000	NA
P.T. Semen Cirebon	Java	500,000	1978
P.T. Semen Nusantara	Java	600,000	1977
P.T. Semen Baturaja	Sumatra	500,000	1978

Source: Directorate General of Chemical Industries.

Table 4.—Indonesia: Imports, Local Production and Consumption of Miscellaneous Chemicals—1974

(in thousands of U.S. dollars)

	Imports	Local Production	Total Consumption
Chemical Elements and Compounds	109,300	16,900	126,200
Dyeing, Tanning and Coloring Materials	49,000	—	49,000
Pharmaceuticals	34,000	80,000	114,000
Essential Oils and Perfume Materials	13,400	100	13,500
Plastics Material and Resins	71,000	9,800	80,800
Explosives	4,100	—	4,100
Other Chemical Materials and Products	77,000	900	77,900
TOTAL	357,800	107,700	465,500

Source: Estimates based on industry sources.

Most firms are engaged in batch processing of imported raw materials, tableting, and processing rather than original formulation. Investment in the industry is estimated at \$100 million, of which \$65 million is by foreign firms and \$35 million by local firms. Total investment in production equipment is approximately \$25 million.

The Government has been requiring firms to increase their purchases of raw materials from local sources. Foreign private investors are legally required to convert their formulation or packaging plants into basic pharmaceutical plants within 5 years of obtaining operating permits. This requirement is particularly enforced in the case of medically important drugs such as the sulfonamides and antibiotics.

Investment in pharmaceutical facilities increased rapidly during the 1968–74 period, but the new investment pace then slackened as the industry began to develop over capacity. One large project under consideration is a \$30-million plant for contraceptive pills production to be built by the Indonesian Government with assistance from the U.S. Agency for International Development.

Salt.—The major salt producing factory is the government-owned plant, P.N. Garam. With an investment of \$1.3 million, the firm provides a large portion of the country's salt production from sea water using a flash evaporation process. The plant is being expanded to enable it to produce 120,000 tons of salt annually by 1979 and 310,000 tons by 1980. Other salt production in Indonesia comes from small cottage-industry operations employing traditional solar evaporation methods.

Caustic Soda.—At the beginning of the current national development plan in 1974, only a few firms produced caustic soda and its associated chemicals, chlorine and hydrochloric acid. The largest factory in the industry was P.N. Soda Waru, a government-owned firm which had a production capacity of 3,000 tons per year. An expansion project will raise plant capacity to 6,000 tons per year. In addition, several companies producing monosodium glutamate have integrated operations to produce caustic soda for their own use. Caustic soda production capacity planned for 1979 is depicted in table 5.

Industrial Gases.—Fifteen firms produce industrial gases in Indonesia; 13 produce oxygen; 11, carbon dioxide; and two, acetylene. The largest is the government-owned P.T. Aneka Gas Industri which produces all three. Production of oxygen is increasing and a number of plants are scheduled for expansion during the 1970's. Planned oxygen production capacity in 1979 is depicted in table 6.

Detergents and Surfactants.—Industry output totaled 11,790 tons in 1975. There are few manufacturers of soaps and surfactants in Indonesia. The largest is P.T. Unilever, part of the multinational Unilever group.

Paints and Varnishes.—Ten firms now manufacture paint in Indonesia. The largest are the British-owned Imperial Chemical Industries, Japanese-owned Nippon Paint, U.S.-owned Sherwin-Williams, and Pacific Paint, a local firm. Production in 1975 was 18 million liters.

Sulfuric Acid.—Only a few companies produce sulfuric acid and aluminum sulfate in Indonesia. One of largest is P.T. Indonesian Acid Industry, which has an annual production capacity of 5,500 tons of sulfuric acid and 80,600 tons of aluminum sulfate. Another large company is P.T. Mahkota Industry, which can produce 20,000 tons of sulfuric acid and 30,000 tons of aluminum sulfate annually.

Explosives.—The only Indonesian explosives firm is the government-owned Perum Dahona. It did not produce during 1976 because of a major plant explosion.

Plastics, Resins, and Fibers.—Between 40 and 50 domestic firms produce plastic articles by injection and blow molding. The largest of these has an in-

Table 5.—Indonesia: Planned Caustic Soda Production, 1979
(in tons)

Plant	Annual Capacity
P.T. Ballapur, Jakarta	15,000
P.T. Soda Waru, Surabaya, East Java	6,000
P.T. Miwon, ¹ Jakarta	4,000
P.T. Rejeki Lancar, Jambi	3,000
Perum Basuki Rachmat, ¹ Banyuwangi, East Java	3,000
P.T. U.C.I., Bandung, West Java	2,400
P.N. Letjes, ¹ Probolinggo, East Java	2,250
P.T. Tjiwi Kimia, ¹ Jakarta	2,045
P.T. Roda Mas, ¹ Jakarta	1,500
Perum, Gowa, ¹ Ujung Pandang, Sulawesi	750
P.N. Blabak, Magelang, Central Java	675
P.T. L.P.S., Jakarta	600
Total	41,220

¹ Integrated, for own consumption.

Source: Directorate General of Chemical Industries, industry sources.

Table 6.—Indonesia: Planned Oxygen Production Capacity, 1979
(in thousands of cubic meters)

Plant	Annual Capacity
P.T. Aneka Gas Industri, branches in Jakarta; Bandung, West Java; Semarang, Central Java; Surabaya, East Java; Medan, Sumatra; Ujung Pandang, Sulawesi	5,400
P.T. Pan Gas Nusantara; Jakarta	2,808
P.T. Nila Alam Surabaya; Surabaya, East Java	432
P.T. Bogor Oxygen; Bogor, West Java	432
P.T. Bekasi Gas; Bekasi, West Java	432
P.T. Surabaya Gas Jaya; Surabaya, East Java	432
P.T. Medan Oksigen; Medan, Sumatra	216
P.T. Sumber Riau; Riau, Sumatra	216
P.T. Sumara Gas & Co.; Jakarta	216
P.T. Gunung Giri Indah; Gresik, E. Java	216
C.V. Bumi Waras; Jakarta	216
P.T. Adhijaya; Jakarta	216
P.T. Karyo Alam; Jakarta	108

Source: Directorate General of Chemical Industries, industry sources.

vestment of \$10 million in equipment, mostly from Japan. Most production is by injection molding of polyethylene and polypropylene. Total industry output is about 200,000 tons of plastic items per year.

Six projects are planned for production of PVC, polymers, and other synthetic resins. As previously noted, Pertamina has a polypropylene plant in South Sumatra near the Pladju refinery site with a production capacity of 20,000 tons per year.

Glass.—Indonesia's production of glass increased from less than 11,000 tons in 1970 to about 40,000 tons in 1975. There are over 20 manufacturers of glass products in Indonesia, but only three can be considered large: P.T. Kangar Consolidated Industries in Jakarta and P.T. Kedaung Subur and P.N. Iglass, both in Surabaya.

Iglass, a State-owned company, is Indonesia's largest glass manufacturer. Plant capacity was increased in the early 1970's from 24,000 tons to 40,000 tons annually under an agreement with Australia Consolidated Industries. The company's

products include all types of bottles and other glassware.

Kangar Consolidated Industries is a multinational joint venture with foreign investors consisting of Australian Consolidated Industries and Owens-Illinois, Inc. of the United States. Design capacity is 14,000 tons of bottles and glassware annually. Kedaung Subur is a locally owned plant with design capacity of 394,200 units of glassware and 146,000 bottles annually, or a total of 20,000 tons of glass per year.

Other glass manufacturers produce flat glass and safety glass as well as glassware, bottles, and containers.

Glass manufacturers use quartz sand from East Java and from Bangka and Billiton Islands. Large quantities of quartz sand are available in Indonesia, including an estimated 15 million tons on Bangka Island, 19.5 million tons on Billiton Island, 3.2 million tons in East Kalimantan, and other major deposits in Java and Sumatra.

The Indonesian Government has protected local manufacturers of glassware with import duty rates of between 40% and 270%.

GOVERNMENT ROLE

In addition to owning large fertilizer, cement, and other chemical plants, the Indonesian Government regulates development of the chemical industries through the Department of Industry. The Department's Directorate-General of Chemical Industries, located at Jalan Kebon Sirih 31, Jakarta, has four divisions: fertilizer, cellulose, silicates, and other chemical industries. (The Silicates Directorate is responsible for development of the cement and glass industries.) The directorate-general maintains liaison with important industry associations in Jakarta such as the Association of Agrichemical Producers, Indonesian Pulp and Paper Association, Oxygen Producers Association, Indonesian Cement Association, Association of Indonesian Fertilizer Producers, and Indonesian Basic Chemistry Association. Some chemical industries, including the pharmaceutical industry, are under the control of the Directorate-General of Light and Handicraft Industries. Petroleum refining and LNG processing are the responsibility of the Directorate General of Oil and Gas (MIGAS) of the Department of Mining.

TRENDS, PROGRAMS, AND PROJECTS

Capital investment in the chemical Industries has grown substantially since 1968. Cumulative foreign

capital investment approved from 1968 through 1975 for the chemical industries totaled \$870 million, while domestic investments during the same period totaled \$1.4 billion. Total foreign investment applications for 1975 and the first quarter of 1976 were valued at over \$148 million. During the same period, domestic investment applications were valued at over \$36 million.

Inadequate information with regard to market demand and domestic resources has hampered government planning for the chemical industry. One of the goals of the first national development plan which ended in 1974 was to survey the foreign and domestic demand for chemical products and determine the natural resources base in order to assess the feasibility for development of domestic chemical industries. Unfortunately, although the individual surveys of the fertilizer, pesticide, and petrochemical industries were completed, they are not comprehensive. Further research was scheduled, however, during the current national development plan. Surveys are planned to determine the raw materials base, the infrastructure needed to support industrial growth (water supply, fuel, road network, electric power, and manpower) and proposed locations of new projects.

Government goals for the chemical industries are revised as circumstances change, particularly within the private sector. Each year the Director-General of Chemical Industries convenes a "working session" of industry and government leaders to review progress and outline new goals. During these sessions specific industrial segments are reviewed. Development of the fertilizer industry was the topic of the 1976 session. The Director-General of Chemical Industries indicated that major emphasis would be placed on utilizing natural gas in South Sumatra, West Java, and East Kalimantan for production of fertilizers. In the production of phosphate fertilizers, however, imported phosphate acid/rock is to be used since these raw materials are not found in commercial volume in Indonesia. Plants which will use these imports are to be located in the coastal areas of Gresik, Cilacap, and Lampung/Palembang. Although plans call for the Government to undertake most capital investment for fertilizer production, private capital may take part in the development of small plants for production of such fertilizers as compost and ground phosphate. Production of fertilizers such as urea and TSP will be emphasized.

In the petrochemical sector, there are two prime government objectives. The first is to fulfill the demand for monomers and polymers as raw materials for plastics and resins, and for synthetic fiber for textiles and household goods. The second objective is to use raw materials available in Indonesia for production of olefins (ethylene, propylene, and

styrene) and refinery-produced naphtha for production of BTX aromatics (benzene, toluene, and xylene).

The general Government strategy with regard to petrochemical production and development in several other industries is described as "synchronized integration" in which raw materials are produced from natural resources and then manufactured into end products. The Government's plan for the development of pesticide and herbicide industries is aimed at producing active ingredients locally as well as finished products. In the cement industry, plants are to be constructed near sources of raw materials, and integrated cement plants are planned to produce everything from clinkers to cement sacks. New plants are to average 500,000-ton annual capacity and to use rotary kiln, dry-process technology.

In the salt and other alkali industries, the Government plans to increase production at the State-owned plant, P.N. Garam, to encourage private enterprise to go into industrial salt production, and encourage iodized salt production to remedy iodine deficiency in the Indonesian diet.

Process Technology

Processing in the chemical industry in Indonesia ranges from highly sophisticated, modern operations, to mechanical handling, mixing and packaging of imported processed materials as in the pharmaceutical industry, and also includes crude hand-grinding and mixing operations which yield highly unreliable products.

Recent rehabilitation and new construction of refineries has brought modern technology to the petroleum industry and opened the field to increased production of quality byproducts.

The two new LNG facilities at Arun and Badak will be among the most modern in the world and will feature the latest in equipment and technological innovations.

Selection of the production method for government projects is often based on the long-term strategies of the Government with several factors taken into consideration. These factors include initial and long-term cost, raw materials requirements and availability, by-products available to support future industrial growth, and immediate and long-range employment opportunities. For example, in the processing of soda ash both the duo-cycle process and the Solvay process were considered in government planning. The duo-cycle process was rated as simpler, but produced ammonium chloride as a byproduct which was not suitable for fertilizer usage. The Solvay process was found to require a higher minimum capacity, 80,000 to 100,000 tons annually, to be economically viable. Consideration was also given to integrated plant pos-

sibilities such as papermills and food flavoring factories and to export possibilities. A regional study within the framework of ASEAN has been proposed.

Phosphoric acid production is by the standard dehydrate process. This process allows the use of a wide variety of phosphate rocks and process control is relatively simple. Some of the newer processes such as Gulf Design Company's isothermal process, Kellogg-Lopker's two-tank reaction system, and Nissan's recrystallization process have been given consideration.

Downstream requirements are a major factor in the Government's emphasis on development of domestic production of synthetic fibers for the textile industry. In the new Pertamina refinery at Cilacap, Fluor used pneumatic instrumentation because it offered advantages in performance and maintenance. Although the instrumentation provides continuous monitoring capabilities, control is manual, in order to accommodate government policies emphasizing increased employment opportunities through development.

Attention is usually focused on highly technical, multimillion dollar projects but many small and moderate sized firms are involved in the production of chemical products. Plastic items, for example, are often produced in small workshops with one or two pieces of injection molding equipment. Thousands of plastic baskets and containers are produced in these low capital, labor-intensive shops. As production in downstream operations becomes more sophisticated improvement in the quality of chemical products used as raw materials is required. Battery production, for example, has undergone vast improvements in recent years. Batteries formerly were produced in workshops using hand-mixing and manually operated mills in the preparation of chemical pastes. Simple methods were used in the production of plates, and battery casings were frequently recycled. A number of battery factories have undergone rehabilitation since 1973 and produce to international standards for the local automobile assembly industry. These firms now require close tolerances in their basic chemicals.

GROWTH PROSPECTS

The Indonesian Government is attempting to increase production in the chemical and petrochemical industries in order to become less dependent upon imports and to save foreign exchange. To this end the nature of imported commodities has already shifted from a heavy proportion of final products to more intermediate chemicals. The next step, importing most basic chemicals, will be more difficult to achieve because the limited size of the local market

makes the production of certain chemicals uneconomical.

A major obstacle to development of the chemical industries is the absence of a comprehensive survey of both demand for chemicals products and supply of available raw materials on which a rational development plan may be based. Some segments have grown very rapidly, while others have lagged far behind their potential. The fertilizer industry, for example, is expected to reach all its goals easily as a result of strong government and international financial support, the availability of raw materials, and good management. Even in this industry, however, there are imbalances. Phosphate fertilizer production, for example, has been neglected.

It is doubtful that the petrochemical industry will be able to meet its projected goals during the current national development plan. Much will depend on the speed with which government officials decide whether to permit large amounts of foreign investment. It appears that because of Pertamina's reduced resources for new investments, increased foreign investment may be the only solution. Delay in approval of the large Dow Chemical project could slow achievement of petrochemical industry goals for a number of years.

Industry experts have expressed concern that more attention has not been given to development of chemical industries based on salt, such as caustic soda, chlorine gas, and hydrochloric acid. Domestic demand for those products is larger than production, and a number of planned industrial projects would substantially increase the demand for caustic soda. This is but one example of the need for balanced development.

Indonesia's cement industry has different problems. It has developed so rapidly that planned goals for this decade will apparently be substantially exceeded. The industry now faces the possibility of excess capacity.

A related problem afflicts Indonesia's pharmaceutical industry. It is reported to be overcrowded, particularly with firms who are simply packaging imported materials. Production of raw materials from local resources needs to be increased.

Indonesia's overall chemical industry growth is expected to be rapid in the coming years, particularly if petrochemical development proceeds on schedule. The major challenge to industry planners will be in meeting raw material supply problems.

MARKET SIZE

The market for chemical and petroleum refining and processing equipment in Indonesia reached \$50 million in 1975, virtually all of it satisfied by im-

ports. Pumps accounted for \$17 million; control and measuring instruments, \$6 million; valves and taps, \$7 million; separation and filtering equipment, \$5 million; and miscellaneous equipment (distillation, compression, heating and cooling equipment, vessels, vats, structures, and catalytic facilities), \$14 million (see table 7).

Total sales of chemical and petrochemical refining and processing equipment increased by 29% between 1973 and 1974 and by another 28% the following year. By 1980 sales are expected to reach \$114 million.

Table 7.—Indonesia: Size of the Market for Chemical and Petrochemical Refining and Processing Equipment
(in thousands of U.S. dollars)

	1973	1974	1975	1976	1980
Pumps for Chemical and Petrochemical Production					
Domestic production	—	—	—	—	100
Imports:					
United States	5,980	5,900	7,500	8,600	17,800
Japan	2,500	3,700	4,700	—	—
West Germany	400	800	1,000	—	—
United Kingdom	630	650	850	—	—
Netherlands	60	550	700	—	—
Italy	120	150	190	—	—
Others	1,000	1,450	1,900	—	—
Total	10,690	13,200	16,840	20,280	37,200
TOTAL MARKET	10,690	13,200	16,840	20,280	37,300
Control and Measuring Instruments for Chemical/Petrochemical Production					
Domestic Production	—	—	—	—	1,000
Imports:					
United States	1,450	1,660	1,680	1,815	3,200
Japan	1,150	1,300	3,200	—	—
West Germany	450	600	500	—	—
Netherlands	150	320	130	—	—
United Kingdom	300	470	170	—	—
France	180	40	175	—	—
Others	50	60	425	—	—
Total	3,730	4,450	6,280	7,275	14,010
TOTAL MARKET	3,730	4,450	6,280	7,275	14,010
Valves and Taps for Chemical/Petrochemical Production					
Domestic Production	—	—	—	—	100
Imports:					
United States	1,600	1,800	2,100	3,200	5,100
Japan	1,450	1,600	2,800	—	—
United Kingdom	600	1,300	1,400	—	—
West Germany	200	150	100	—	—
Netherlands	350	250	430	—	—
Italy	50	150	450	—	—
Others	800	700	120	—	—
Total	5,050	5,950	7,400	9,190	15,200
TOTAL MARKET	5,050	5,950	7,400	9,190	15,300
Separation and Filtering Equipment for Chemical/Petrochemical Production					
Domestic Production	10	50	100	120	200
Imports:					
United States	142	500	200	480	970
Japan	788	2,134	3,300	—	—
West Germany	400	490	610	—	—
Singapore	200	245	300	—	—
United Kingdom	100	125	156	—	—
Australia	50	65	80	—	—
Others	200	250	310	—	—
Total	1,880	3,809	4,956	6,070	12,140
TOTAL MARKET	1,890	3,859	5,056	6,190	12,340

Table 7.—Indonesia: Size of the Market for Chemical and Petrochemical Refining and Processing Equipment
—Continued

(in thousands of U.S. dollars)

	1973	1974	1975	1976	1980
Other Chemical/Petrochemical Production Equipment					
Domestic Production	20	50	80	300	3,200
Imports:					
United States ..	2,958	1,370	3,730	4,600	8,320
Japan	2,252	5,462	6,610	—	—
West Germany	866	765	1,430	—	—
United Kingdom	721	434	1,000	—	—
France	128	776	720	—	—
Switzerland	8	455	430	—	—
Others	225	407	440	—	—
Total	7,158	9,669	14,360	17,600	32,000
TOTAL MARKET	7,178	9,719	14,440	17,900	35,200
TOTAL MARKET SIZE ..	28,538	37,178	50,016	60,835	114,150

Sources: Official Indonesian and supplier statistics, and estimates based on trade source interviews.

Between 1973 and 1975 the rapid expansion in cement and fertilizer plant construction, the development of the Cilacap petroleum refinery, and large investment in pharmaceutical plants were responsible for much of the market growth. During the next few years large LNG projects, additions and expansions of fertilizer and cement plants, and the initial work on petrochemical complexes will sustain similar increases in equipment consumption.

Imports

Japanese manufacturers had a 41% share of the import market in 1975. U.S. manufacturers had the next largest share, 30%.

U.S.-made products are considered durable and competitively priced and are expected to retain their market position throughout the remainder of the 1970's.

In the pumps subcategory, U.S. firms predominated with 48% of the sales; Japanese manufacturers supplied 28%. Japanese suppliers now sell just over half the control and measuring instruments bought in Indonesia, compared with 27% supplied from the United States. The share supplied from Japan is expected to increase slightly by 1980. Most of the instruments imported from Japan are made by Japanese licensees or joint ventures of American firms such as Foxboro, Hewlett-Packard and Honeywell. The good reputation of these firms coupled with attractive Japanese pricing and delivery terms assure them a continued competitive position in this market segment.

In 1975, U.S. manufacturers satisfied about 28% of the demand for valves while suppliers in Japan provided 38%. As Indonesia's requirements become more sophisticated and the demand for very high pressure and highly sophisticated valves increases, the U.S. suppliers' market share is predicted to grow

at a faster rate. By 1980 U.S. firms are projected to have a 34% market share compared to 32% for Japanese suppliers.

In the sales of separation and filtering equipment, Japanese suppliers have the strongest market position (65% of the market in 1975) as a result of their competitive prices and proximity to the market. Manufacturers in West Germany, Singapore, and the United States also participated. Japanese suppliers are expected to retain their leadership position through 1980.

Domestic Manufacturing

There is little local production and no export of chemical and petrochemical production equipment in Indonesia. Some metalworking firms produce various types of kettles, vats, tanks, and other items made from sheet metal, on a custom order basis, and larger metalworking firms have produced a few pressure vessels. Substantial growth in this area of domestic production is forecast by 1980, as local metalworking and machining firms become more technically competent.

Although there is some local manufacture of separation and filtering equipment for chemical/petrochemical production, it is expected to remain minor for the foreseeable future. No process control instruments were produced in Indonesia as of the mid-1970's, but two assembly facilities are planned. One is a \$500,000-joint venture between Foxboro Pte. Ltd., the Australian subsidiary of the U.S. firm and P.T. Aneka Perkind in Jakarta. The other is a joint venture between Teijin Seiki Company and Teijin Ltd. both of Japan, and P.T. Teknik Umum; it has a capital investment of \$2 million and is to be located in Tangerang, West Java.

MARKET OPPORTUNITIES

Major chemical processing projects will remain the largest market for equipment sales for several years. However, there will be increasing expansion upstream into the processing of domestically available raw materials and downstream into final processing and production of industrial and consumer goods. Moderate size domestic firms will play an increasingly important role in the chemical industry in future years.

Construction of additional stages of the two LNG plants at Aceh and Badak will necessitate purchase of a wide range of equipment. Specific equipment required by the LNG processing plants includes: cryogenic process equipment and exchangers, cryogenic loading and recirculating pumps, sheet and tube heat exchangers, vibration motor systems, special vessels, pumps and turbine drivers, pre-insulated transfer sys-

tem piping, compressors and drivers, steam drivers for compressors, surface condensers, boiler feedwater deaerators, absorbers, amine regenerators, safety valves, process control equipment, carbon steel flanges, steam boilers, process pumps, and nitrogen generators.

For construction of petrochemical complexes, the largest amounts of money will be spent on gas turbines, high pressure piping, high pressure valves and fittings, compressors, chemical and process pumps, process control instruments, and various types of special reaction vessels.

The plastics industry is expected to develop rapidly. There is great potential for increased use of plastic containers and wrapping materials providing traditional preference factors can be overcome. Domestic manufacturers are expected to become the prime source of such household items as containers, baskets, dishes, shoes, and rainwear. Production equipment will also be needed for industrial items such as rigid and flexible pipe, fittings, and valves.

The Government is enforcing requirements for initiation of basic processing within the pharmaceutical industry, primarily in the field of life-saving drugs. Moves to intermediate and basic processing will necessitate purchases of crushing and sorting machinery, weighing devices, liquid, air, and vacuum pumps, and pressure and processing vessels. Parallel to the development of the pharmaceutical industry, the production of proprietary drugs and cosmetics is also increasing. The necessity to adhere to international quality standards will require heavy purchases of both on-line and laboratory quality control instruments and laboratory testing and glassware items. Expansions within other chemical industries and the emphasis on increased research will also stimulate sales of quality control instrumentation and laboratory equipment.

Officials of Pertamina, the national petroleum corporation, indicate that there are sales opportunities for equipment parts and maintenance of the refineries already built, and that preference normally is given to original equipment suppliers or their licensees. The Pladju and Balikpapan refineries were built primarily with European equipment, the Dumai refinery was of Japanese design, and the Sungei Baknin refinery was built mainly with U.S. equipment. Other refineries are old and replacements have been made so often that their design can no longer be identified with any one country.

Exceptional sales opportunities in the chemical and petrochemical fields exist for technology and design, purchasing, and construction services such as are now being offered by Fluor, Bechtel, Kellogg, and other U.S.-based firms working on projects in Indonesia. Indonesian firms will also be seeking patented chemical processes for purchase on a fee or

royalty basis. Overseas contractors will be required to design entire plants, assist in purchasing equipment, and supervise construction to completion, particularly in the proposed petrochemical projects.

Technical assistance is also needed in management, long-range planning, research, and marketing. Government plans call for the development of "synchronized integration" for the most effective use of the chemical industry in support of national development goals. There is a need for detailed studies of the industries and processes that will be the most effective in assisting Indonesia to meet its goals of the utilization of natural resources and the expansion of domestic industry.

The developmental strategies of the Directorate of Chemical Industries are outlined in three papers which are available from the Directorate. These papers include discussions of long- and short-term goals, priorities, and details of key down and upstream activities. They are excellent sources for the identification of market opportunities for capital equipment, technology and professional services.

IMPORT PROCUREMENT

Buyers Universe

The buyers universe for chemical and petrochemical equipment in Indonesia includes the large government-owned organizations (see table 8), private firms, and consulting and engineering firms.

Each government-owned and private enterprise makes its own decisions regarding minor equipment purchases. For large equipment purchases, however, the Directorate-General of Chemical Industries, Bappenas the national development planning authority, and, in some cases, the Presidential Palace and Ministry of Finance often strongly influence the choice of sources of financing, and the country obtaining the project. Thus, in order to make sales, suppliers must often deal with many decisionmakers as well as the end users.

Except in the case of foreign assistance loans which may specify origin of equipment, international open tenders are the most common purchase procedure, particularly in cases where large expenditures of funds are involved.

The private sector of the chemicals industry includes large firms making agricultural chemicals such as herbicides and pesticides, pharmaceuticals, and cement. Many of these, including Dow Chemical, Mobil Oil, Pfizer Corporation, and Rohm and Haas, are multinational firms with offices in the United States and other parts of the world. The bulk of large private investment in Indonesia's chemical industries includes participation of Japanese, Ameri-

Table 8.—Indonesia: Addresses of Major Government Organizations in Chemical Industries

Government Departments

Directorate General for Chemical Industries

Jl. Kebon Sirih 31

Jakarta

Directorate General for Light Industries and Handicraft

Jl. Kebon Binatang III/8

Jakarta

Government-owned Firms

Petroleum Refining and Petrochemicals

Pertamina

Jl. Perwira 6

Jakarta

Fertilizers

P. T. Pupuk Sriwijaya (Pusri)

Palembang

South Sumatra

P. T. Petrokimia Gresik

Jl. Jenderal A. Yani

Gresik

East Java

Gas Industry

P. T. Aneka Gas Industri

Jl. Minangkabau 60

Jakarta Selatan

West Java

Cement

P. T. Semen Gresik

Jl. Veteran

Gresik

East Java

P. T. Semen Padang

Jl. Batang Arau 22

Padang

Sumatra

P. T. Semen Tonasa

Jl. Chairul Anwar 26

Ujung Pandang

Sulawesi

Caustic Soda

P. N. Soda Waru

Jl. Raya 31

Sidoarjo

East Java

Pharmaceuticals

P. T. Kimia Farma

Jl. Budi Utomo 1

Jakarta

Source: Industry Sources.

can, Canadian, Australian, or European firms. In selecting equipment, companies often have their own design and purchasing department with relatively fixed sources of procurement and standard designs.

Consulting and construction engineers play an important role in equipment purchasing and selection.

For example, the Bechtel Corporation in building the two LNG plants for Pertamina also acts as the purchasing agent. After receiving guidelines from Pertamina regarding certain equipment purchases, Bechtel invites worldwide bids and selects equipment suppliers on the bases of price, quality, delivery, after-sales service, past performance, and designers' preferences. Often, because of funding sources, certain items must be purchased from suppliers in specific countries. In the LNG plant construction at Aceh, Pertamina specified that the LNG storage tanks be purchased in Japan, since the Japanese are funding major portions of the project. The Fluor Corporation, which among other projects is building the Cilacap refinery and offshore gas processing facilities, maintains a staff of more than 200 buyers located in the United States and six other countries. They are backed up by inspectors, expeditors, and traffic specialists. Indonesian buyers tend to allow contractors like Fluor with efficient corporate staffs to undertake purchasing because of the complexities involved.

Foreign Suppliers Universe

Foreign suppliers of chemical and petrochemical equipment may supply entire plants or individual equipment items. Suppliers from East European countries and Japan often offer small, specialized, individual-product plants. One supplier assumes responsibility for an entire plant, ships all parts from the source country, and constructs them at the site. The overseas subsidiaries of some U.S. firms also bid on complete plant projects. Kellogg and Morrison Knudsen are major contractors in the Indonesian cement and fertilizer industries.

Prominent third-country suppliers of complete cement plants include F.L. Smidth (Denmark); K.H.D. and Klockner (West Germany); C. Itoh and Company, Toyo Engineering, Sumitomo, and Mitsubishi (Japan); and Taiwan Machinery Manufacturers (Taiwan). Suppliers of complete fertilizer and petrochemical plants include Friedrich Uhde (Germany); Chemoprojekt (Czechoslovakia); and Mitsui, Mitsubishi, and Sumitomo (Japan).

Japanese firms lead in providing individual equipment items, followed by manufacturers in West Germany, the United Kingdom, and Australia. Balcke-Durr of Germany is a leading supplier of sheet and tube heat exchangers, and Bernard-Smith Ltd. of Australia is a major supplier of special vessels. Hitachi Zosen of Japan is the leading provider of storage tanks and special vessels. Ishikawajima Harima Heavy Industries of Japan sells carbon steel flanges and parts. A major portion of process pumps come from the Japanese licensee of Worthington Company (U.S.), Nigata Worthington Co. Ltd., and Nippon Machinery Ltd. of Japan.

Japanese suppliers have been able to obtain a significant market share by offering very competitive financing terms. The terms of projects funded by the large Japanese trading firms or banks generally require sourcing in Japan. As a result Japanese equipment suppliers have gained a good market position. Moreover, Japanese suppliers have established and maintained successful relationships with potential users and engineering firms engaged in plant design and construction.

Marketing Factors

Most of Indonesia's chemical and petrochemical equipment is imported through major engineering and contracting firms such as Fluor, Bechtel, and Kellogg. For large projects like the Pusri expansions and LNG plants, the worldwide buying offices of the contracting firms handle the orders and ship goods directly to the plant sites in Indonesia. For smaller construction or expansion projects, plant owners or operators may order equipment directly from the overseas supplier and install and maintain it themselves. Alternatively, a buyer may engage a local or regional representative to order equipment and assist in its installation and service. In cases where suppliers use Singapore as a regional base, equipment is stored and shipped from there, and service personnel come to Indonesia for installation and repair work.

For major equipment sales, financial arrangements are of prime importance; suppliers who are able to offer the best credit terms normally have the competitive advantage. Delivery time especially for replacement parts, is also important. Suppliers able to offer fastest and most comprehensive service will be favored.

Successful promotion of equipment for the petrochemical and chemical industries requires a multifaceted approach in the Indonesian market since foreign contractors and engineers are usually involved in construction and purchasing for large projects. Indonesian users not only participate in purchase decisions on large plants, but they usually control purchase decisions for smaller projects, replacement parts, and plant expansions.

Successful suppliers reach decisionmakers through distribution of technical literature and brochures, by direct calls of sales representatives, and through technical presentations at professional meetings through specially organized seminars. Even more important is maintaining a working relationship with consulting and engineering firms to ensure consideration of the supplier's participation in major projects.

COMPETITIVE POSITION OF U.S. SUPPLIERS

U.S. suppliers of chemical/petrochemical equipment have an excellent market position for a number of reasons. They have a recognized technological lead in a number of advanced, chemical processes and design of specialized equipment; U.S.-based contracting and engineering firms have played an important role in the design, construction, and supply of equipment for Indonesia's chemical plants; and the financing which has been available from the United States for large chemical processing projects. The two major impediments to sales of U.S. equipment are the long delivery times, particularly in relation to competition from Japan, and the relatively high prices for some equipment.

Most industry sources cite the strong technological lead of U.S. suppliers as the major factor in U.S. sales in Indonesia. For example, cryogenic exchangers and cryogenic loading and recirculating pumps for the Arun LNG plant were imported from the United States because only American suppliers make the design and quality required.

Some other equipment which is not uniquely American is also being purchased from U.S. suppliers because they have maintained close contacts with Bechtel engineers in the United States who are designing the plant.

The participation of American design and engineering firms in major Indonesian chemical plant projects has often resulted in increased sales of U.S. equipment. In the Indonesian fertilizer industry, a favorable attitude toward U.S.-made equipment has been created not only through construction of fertilizer plants by U.S. firms, but also through the work of American experts who have served as consultants on fertilizer supply and production. The \$245-million Kellogg contract for construction of the P.T. Kudjang urea plant is expected to offer good sales opportunities for U.S. equipment suppliers. It is important to note that the American engineering firm Kellogg obtained the contract despite the fact that the United States is not the prime source of financing; the Government of Iran has provided a \$200-million, soft-term loan for that project.

Of course U.S. financing for major projects does facilitate purchase of U.S. equipment, especially when it is provided at the beginning of projects which are to be developed in stages. The first Pusri plant was financed largely by a \$33-million loan from the U.S. Export-Import Bank. The U.S. contracting firm, Morrison-Knudsen, was the prime contractor for construction of the plant, and most of its equipment was imported from the United

States. The success of the first plant greatly influenced decisions with regard to subsequent Pusri plants, all of which have been built primarily with U.S. equipment and designed by Kellogg.

Morrison-Knudsen also was responsible for construction of the original Semen Gresik cement plant; it subsequently obtained the contract for two expansions. A U.S. Export-Import Bank loan of \$17 million for expanding the Gresik cement plant stimulated imports from the United States worth \$42 million. Another Export-Import Bank loan of \$54 million and guarantees for additional loans for the Pertamina Cilacap refinery have resulted in large

sales of U.S. equipment. U.S. manufacturers have supplied almost half of the \$300 million worth of equipment for the project for which Fluor was the prime contractor.

Many U.S. companies have won repeat sales through building their reputation for providing good aftersales service. Delivery time, however, remains a major problem for U.S. suppliers. Some U.S. firms are now warehousing equipment in Singapore or Hong Kong and arranging for more rapid shipping. Where price, weight, and volume permit, they are also using air freight.

Construction and Public Works

The construction industry has been one of the more active components of gross domestic product (GDP) in recent years. In 1971 construction activity accounted for 3.1% of GDP, and in 1974 its share increased to 4.4%.

Between 1971 and 1975, the value of construction activity grew at an average annual rate of about 20% from \$412 million. This growth reflected the high level of domestic and foreign private investment and government expenditures for rehabilitation and expansion of infrastructure.

As a result of such factors as a leveling off in the growth of foreign investment, and the tightened budgets required by the fiscal problems of the State oil company, Pertamina, the growth of construction activity is expected to slow during the 1975-80 period. Nevertheless, it is expected to average about 10% a year, well above the 7.5% annual growth rate established as a target for the economy as a whole during the current 5-year national development plan.

The inflow of capital from international aid projects generates considerable construction activity. In 1976, over \$2 billion of such aid was pledged, of which a considerable part was earmarked for construction and equipment. Another indicator of construction activity is the level of foreign and domestic capital investment. During the 1968-75 period, 823 foreign and 2,833 domestic investment projects were approved with a total authorized capitalization of \$6.5 billion and \$4.1 billion, respectively. The construction component of investment projects in Indonesia can be considerably higher than in more developed countries, because investors are frequently required to spend heavily for site preparation, and to provide such infrastructure as electric power, roads, docking facilities, employee housing, etc.

INDUSTRY STRUCTURE AND SITE

The construction industry includes contractors and builders varying greatly in size from very small family-owned contracting firms with a few workers, which rely on traditional hand methods of carpentry, masonry, and other building skills, to the small number of very large firms engaged in major public works

projects using modern construction equipment and techniques.

In past years, finding a local firm with over 100 workers or any significant knowledge of modern building methods and engineering was unusual. Since 1970, however, with the increasing demands for public and private construction, local construction firms have grown in size and experience. A number, including P.T. Waskita Karya and P.T. Hutama Karya are State-owned and have close ties to government departments. Some have gained valuable experience from joint ventures with foreign firms, while others have sent executives abroad for training, or have engaged foreign-trained technicians. Although these local contractors have grown rapidly in recent years, they are still not capable of handling all the requirements of large-scale construction projects. The largest, local construction firms are: P.T. Djasa Ubersakti, P.T. Adhi Karya, P.T. Pembangunan Jaya, P.T. Wijaya Karya, P.T. Pembangunan Perumahan, and P.T. Hutama Karya.

P.T. Pembangunan Perumahan was founded in 1953 by the Bank Industri Negara (presently the State-owned Indonesian Development Bank) as its subsidiary company. The firm is headquartered in Jakarta and has branch offices in the major provincial centers. Total contracted value of construction for the firm in 1975 was about \$40.9 million, up 42% from the previous year. Typical projects have included bridges, earthfill dams, wharves, civil works for steam power plants, hospitals, office buildings, hotels, etc. For example, in the 1960's the firm built the 427-room Hotel Indonesia and subsequently constructed the 29-story Nusantara Office Building including its associated 352-room President Hotel all in Jakarta. The firm uses a full range of heavy equipment including its own electric power generation equipment, pumping units, road paving equipment, earthmoving machinery, concrete mixing equipment, pile driving machinery, and materials handling equipment.

Foreign contractors also play an important role in the industry. These firms bid on the large public works projects funded by the World Bank and other institutions, in addition to undertaking a number of major private and public sector mining, chemi-

cal, petroleum, fertilizer production, and other projects which are beyond the technical or financial capability of local firms.

U.S. firms such as Fluor and Bechtel have multi-million dollar contracts for petroleum refineries, liquefied natural gas plants, and other projects. For the Jagorawi (Jakarta-Bogor-Ciawi) Highway started in 1974, the contractor was Hyundai Construction of South Korea, while Trans-Asia Engineering (U.S.) was in charge of project supervision.

A number of foreign engineering and consulting firms are involved in Indonesian projects, particularly those which are financed from foreign sources. Camp, Dresser and McKee International of Boston are involved in studies of water, wastewater, and drainage facilities for the city of Surabaya. Swan Wooster Engineering Company of Canada was appointed the prime consultant for the development of Tanjung Priok, Jakarta's main port.

A list of leading foreign construction, engineering, and contracting firms active in Indonesia is given in table 1. Some foreign firms have entered into a variety of technical agreements or joint ventures with local construction companies, in addition to running their own operations.

Construction in Indonesia utilizes every method from the latest engineering techniques to ancient practices of splitting and weaving bamboo into mats for walls. Materials include highly sophisticated imported materials and products, domestically produced items, and locally produced raw materials.

Construction costs for commercially produced buildings and homes vary by the class of construction and during 1975 in Jakarta ranged from \$126 to \$189 per square meter for low cost construction, \$145 to \$218 per square meter for average construction, and \$182 to \$262 per square meter for luxury construction. Construction costs outside of Jakarta range from 21% lower in South Sulawesi to 53% higher in Irian Jaya.

In the major cities more modern construction materials are coming into use with masonry used for foundations and reinforced concrete for columns. New Jakarta construction includes modern multistory office, hotel, and industrial buildings featuring curtain walls, reflective glass, wall-to-wall carpeting, plastic tiles, recessed lighting, central air-conditioning, and high speed elevators. However, it is not unusual to see a modern luxury building being built with hand-mixed cement which is carried and put in place one bucket at a time, and almost all construction scaffolding is lashed bamboo, even on high-rise buildings.

Table 1.—Indonesia: Foreign Construction, Engineering, and Contracting Firms With Operations or Offices in Indonesia

Name	Country
Bechtel Inc.	U.S.
E. E. Black Ltd.	U.S.
Brown and Root Inc.	U.S.
Chicago Bridge and Iron Co.	U.S.
Leo A. Daly Co.	U.S.
Dravo Corp.	U.S.
Fluor Corp.	U.S.
Franki Foundation Co.	U.S.
Kellogg Overseas Corp.	U.S.
J. Ray McDermott and Co.	U.S.
Morrison-Knudsen International Co	U.S.
M.W.K. International Inc.	U.S.
Procon Inc.	U.S.
Petrosea International	U.S.
Santa Fe International	U.S.
Trans-Asia Engineering	U.S.
Williams Brothers Engineering	U.S.
Alfred A. Yee and Associates	U.S.
Gammon Ltd.	Hong Kong
Takenaka Corp.	Japan
Ohbayashi Gumi Corp.	Japan
Sekayu Corp.	Japan
Taisei International Corp.	Japan
Pacific Architects and Engineers	Japan
Japan Industrial Land Development Corp.	Japan
Hyundai Construction Co.	South Korea
RETSEER Engineering Agency	Taiwan
Kaiser Engineers	U.S.
Irby Construction Co.	U.S.
Charles T. Main International	U.S.
Adrian Wilson Associates	U.S.

Source: Trade interviews.

TRENDS, PROGRAMS, AND PROJECTS

The largest share of Indonesian construction activity is in the hands of the Government; however, there has been a discernible shift toward more private construction. Starting with the current development plan, government policy changed toward encouragement of private sector construction activity. According to government officials, the shift from government to private construction work was already occurring in the latter years of the first development plan. For example, 69% of construction in 1971 was in the government sector while 31% was in the private sector. By 1975 private sector construction activity is estimated to have reached 45% of the total.

In the past construction activity was concentrated on the island of Java and particularly in the Jakarta area; recently more construction has taken place in

outlying areas, particularly as large projects (such as the LNG plants in Kalimantan and Sumatra) and expanded mining activities (such as the rehabilitation of the Bukit Asam mine) get underway.

Major construction projects have had a strong impact on local and private construction activity. For example, in the Cilacap area, construction of the Pertamina refinery and a cement plant has resulted in considerable private construction of housing and commercial establishments.

The financial problems of Pertamina, the national petroleum corporation, in 1975 and 1976 had an impact on the construction industry, since Pertamina was funding a number of major construction projects such as the Krakatau Steel Complex and various commercial buildings in addition to petroleum-related construction.

Although the Pertamina problems resulted in a reassessment of many projects, the Government found that many activities already underway could not be abandoned without considerable loss, so it stepped in with the required financing or rescheduled payments. Construction activity consequently slowed down in some projects, but continued normally in others. For example, vital infrastructure projects in the areas of electric power, roads, irrigation, reclamation and harbors, have not been greatly affected by the Pertamina crisis. Since many of these projects have been funded primarily by foreign governments and institutions such as the World Bank, they will continue, although there may be setbacks if the Indonesian Government has difficulty in meeting its portion of the fund commitments.

A large number of major projects in infrastructure development, and in manufacturing and extractive industries which will involve considerable construction expenditures is underway or planned. A list of major projects is given in table 2. These

Table 2.—Indonesia: Major Projects List—Continued

Project Name	Fund Source ¹	Completion Date	Cost \$ Million
Irrigation VI	IBRD	1980	175
Karangsambung Multipurpose Dam	ADB	1978	5
Irrigation VII	IBRD	1985	80
Water Resources Projects	IBRD/ADB/IGGI	1980	272
Land Reclamation Projects ...	US EXIM/IGGI	1980	400
Agriculture			
Six Sugar Mills, Phase I	—	1980	350
Six Sugar Mills, Phase II	—	1982	600
Transportation			
Highway Projects	IBRD/ADB/US EXIM	1980	430
Jakarta International Airport ..	—	1985	450
Dockyards	IGGI/GOI/IBRD	1980	28
Harbor Expansions	" " "	1980	277
Tanjung Perak Port,			
Surabaya	ADB	1980	42
Belawan Port, Medan	ADB	1980	93
Cirebon Port, West Java	—	1985	10
Semarang Port, Central Java ..	—	1985	17
Teluk Bayur Port, Padang ...	—	1985	5
Tanjung Harbor Phase III ...	—	1977	70
Chemicals and Petrochemicals			
P. T. Semen Baturadja	ADB	1978	78
P. T. Semen Padang	—	1978	80
P. T. Semen Nusantara	—	1978	70
P. T. Semen Tonasa	Canadian, French, German Consortium	1979	100
P. T. Semen Cirebon	—	1978	70
P. T. Distinct Indonesia Cement Expansion	FNCB	1980	20
Petrochemical Complex	Dow Chemical Corp.	1985	1,000
Aromatics Projects—Pladju ...	—	1985	400
P. T. Kudjang Ammonia/Urea	Iran	1983	245
PUSRI IV	IBRD/Saudi Arabia	1980	180
Ammonia/Urea—Aceh	—	1985	200
Petrokimia Gresik TSP/NPK ..	France	1980	60
Pulp and Paper Industry	—	1985	200
P. T. Semen Gresik—Expansion	US EXIM	1980	90
P. T. Semen Cibinong Expansion	P. T. Semen Gresik Kaiser Cement	1980	26
Extractive Industries and Metallurgy			
P. N. Tambang Batubara Coal Mines	Royal Dutch Shell	1985	1,200
Aneka Tambang Bintan Alumina	USSR	1985	275
Gag Island Nickel Project ...	—	1985	750
INCO Nickel Project—Stage II	US EXIM	1985	650
P. T. Krakatau Steel—Cilegon	—	1985	1,050
LNG—Aceh	Japan	1980	1,200
Asahan Multipurpose	Japan	1980	900
ALCOMIN Bauxite Project ..	—	—	1,200

¹ Funding sources: International Bank for Reconstruction and Development (IBRD), International Development Association (IDA), Asian Development Bank (ADB), U.S. Agency for International Development (USAID), Inter-Governmental Group on Indonesia (IGGI), U.S. Export Import Bank (U.S. Exim), Government of Indonesia (GOI), First National City Bank (FNCB).

Source: Based on Official U.S. and Indonesian Publications and Industry Sources.

Table 2.—Indonesia: Major Projects List

Project Name	Fund Source ¹	Completion Date	Cost \$ Million
Public Works			
Jatiluhur Irrigation	IBRD/IDA	1977	109
Pekalen-Sampean Irrigation IV	IBRD/IDA	1978	13
Madium Groundwater	IBRD/IDA	1978	2
Sempor Dam and Irrigation ..	ADB	1979	18
Wampu Flood Control	ADB	1978	6
Kali Surabaya River Improvement	Japan	1980	5
Way Umpu and Way Pangubuan Irrigation	Japan	1978	6
Luwu Area Improvement Irrigation	US AID	1979	6
Jatiluhur Extension Irrigation ..	IBRD/IDA	1982	30
Jatigede Multipurpose Dam ...	Australia	1983	7
Wonogiri Multipurpose Dam ..	Japan	1984	110
Simple Irrigation	US AID	1979	24

projects extend through 1985. Although many are uncertain, a substantial portion has already been funded. If all projects are completed according to schedule, total expenditure will amount to over \$12.4 billion between 1976 and 1985. Many of these projects are described in the following paragraphs. Further details on other projects are included in each of the industry reports in this survey.

Electric Power.—Between 1976 and 1985 electric power generating projects planned by the national electric power utility and private firms call for a total additional power output of 8,650 MW involving an investment of over \$3.8 billion. As of mid-1976, a total of 4,174 MW of power capacity valued at \$1.3 billion had been funded; this will involve substantial expenditures for civil works (see: Electric Power).

Road Construction.—Bina Marga, the Directorate-General for Highway Construction within the Department of Public Works and Electric Power, is responsible for road maintenance and construction of new roads throughout the country. (For a description of the road network, see Transportation.) The Government has devoted substantial

resources to the vitally needed maintenance and rehabilitation of existing roads. There is also an on-going program for building new roads.

Government plans for improvement of roads during the current 5-year plan include the rehabilitation of 14,000 km of roads and the upgrading of 5,000 km of roads thus considerably reducing the roads classified as in damaged or heavily damaged condition (see figure 1). Targets which have been set for the current plan include the following:

Description	Units
Road maintenance	32,000 km/year
Road rehabilitation	14,000 km
Road upgrading	5,000 km
New road constructed	1,170 km

The Directorate-General for Highway Construction has divided its new highway program into four major highway projects starting in 1969. The fourth project "Highway IV," will involve a foreign exchange cost of \$130 million. This makes it the largest program undertaken up to this time.

Major road building and improvement projects underway or planned during the latter part of the current national plan involve substantial foreign assistance funding, including the following:

Project	Funding
Aceh-Palembang, Sumatra ..	U.S. AID, ¹ World Bank
Menado-Makunan, Sulawesi.	World Bank
West Coast Road, Kalimantan	Australia
Jakarta-Bogor-Ciawi (Jagorawi) Java	U.S. AID ¹
South Sumatra	Japan

¹ U.S. Agency for International Development.

The Aceh-Palembang Trans-Sumatra Highway Project includes both road improvement and new road construction. When completed it will have a major impact on road transport in Sumatra. Of the U.S. AID assistance, \$10.3 million will be used to upgrade and construct 321 km of roads and bridges. U.S. AID's loan for the Jagorawi highway program was \$26.8 million. All projects listed above are expected to be completed by 1980.

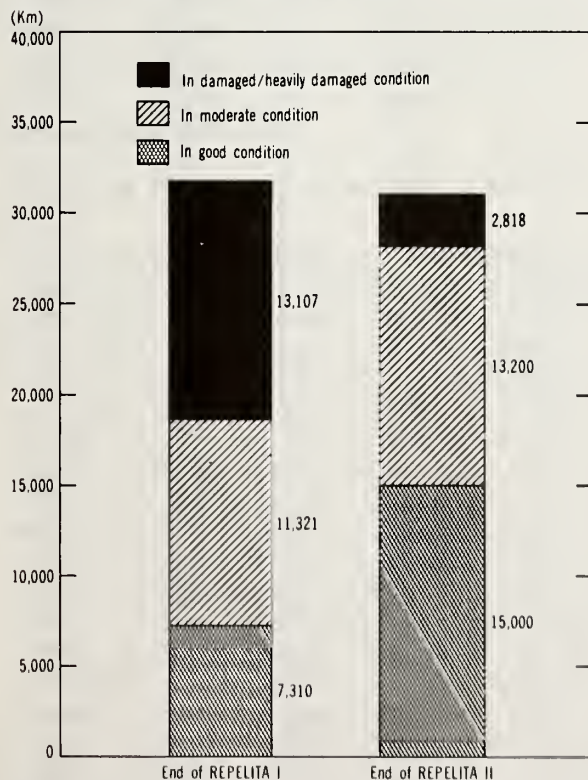
Irrigation.—The Directorate-General for Water Resources Development, within the Department of Public Works and Power, is responsible for irrigation and land reclamation projects. Targets during the current plan period include:

Improvement and repair of irrigation facilities affecting 834,698 hectares of rice fields

Construction of new irrigation networks affecting 950,000 hectares

Construction of irrigation networks and reclamation work affecting 679,190 hectares including

Figure 1.—Indonesia: Planned Improvements in Condition of State and Provincial Roads During Repelita II (1974/75-1978/79)



Source: Repelita II

163,000 hectares of irrigated rice fields and 516,190 hectares protected against floods

Investments in new irrigation projects and irrigation rehabilitation for the 1976 to 1985 period would have to reach a total of \$1.3 billion to meet projected government goals. It is problematical, however, whether this expenditure level will be reached because of Indonesian organizational and financial constraints.

Of most interest to overseas suppliers of equipment would be funds committed from foreign sources for various water resource projects. Table 3 lists irrigation projects under the first two national development plans. Total value of these projects is estimated at \$445 million for the first plan period and \$488 million for the second plan period.

The Government has applied to the World Bank for a \$65 million loan to assist in the \$165 million Cirebon-Rentang-Sampean Baru irrigation rehabilitation and expansion project. The project includes

construction of the Jatigede Dam on the Cimanuk river. This multipurpose earth and rock-fill dam would provide dry season irrigation for 85,000 hectares in the Renteng area and 30,000 hectares in the Cirebon area. Second and third phase planning calls for construction of diversions from the Cilutung and Cipeles rivers into the Jatigede reservoir to provide hydropower of 400 MW and 800 MW respectively. Feasibility studies for the dam were conducted as part of a joint venture with NEDECO (the Netherlands) and SMEC (Australia). Work on the three component irrigation systems includes the following:

Cirebon System

Rehabilitation of 117 existing headworks and weirs;

Reconstruction of 450 km of primary and secondary canals;

Table 3.—Indonesia: Major Water Resources Development Projects With External Assistance
(in millions of U.S. dollars)

Repelita I (1969/70–1973/74) Project	Local	Foreign Exchange	Total	Planned Completion Date
Solorejo Dam, irrigation, hydropower (Japan)	5.70	3.04	8.74	1971
Karangates Dam, irrigation, hydropower (Japan)	21.36	11.14	32.50	1972
Tajum Irrigation, irrigation (ADB)	9.81	.99	10.80	1973
Dredgers Rehabilitation, flood control (Netherlands)	—	.16	.16	1975
Irrigation I (Way Seputih, Cisedana, Retang, Clapan Sedadi) irrigation (IBRD/IDA) ..	26.61	5.00	31.61	1976
Kali Porong and Lengkong Baru Dam, flood control, irrigation (Japan)	12.77	4.07	16.84	1973
Semarang-Kudus Irrigation Rehabilitation, irrigation (Netherlands)	9.81	1.25	11.06	1975
Irrigation II (Jatiluhur), irrigation, flood control (IBRD/IDA)	90.39	18.50	108.89	1977
Irrigation III (Ciujung, Pemali-Comal, Sadang), irrigation (IBRD/IDA)	28.77	14.50	43.27	1976
Delta Brantas Irrigation Rehabilitation, irrigation (Japan)	6.51	1.30	7.81	1974
Dredgers Rehabilitation, flood control (Japan)	—	.20	.20	1974
Jakarta Flood Control Phase I, flood control (Netherlands)	120.48	1.02	121.50	1975
Gambarsari-Pesanggrahan Irrigation Rehabilitation, irrigation (ADB)	6.02	2.70	8.72	1976
Kali Progo Irrigation, irrigation (United Kingdom)	—	1.35	1.35	1975
Ular River Flood Control, flood control (Japan)	—	1.30	1.30	1976
Irrigation IV (Pekalen-Sampean), irrigation (IBRD/IDA)	—	12.50	12.50	1978
Madiun Groundwater (IBRD/IDA)	—	2.43	2.43	1978
Sempor Dam and Irrigation, irrigation and hydropower (ADB)	9.20	9.20	18.40	1979
Kediri-Nganjuk Phase I, irrigation (United Kingdom)	—	.67	.67	1974
Wampu Flood Control, flood control and irrigation (ADB)	—	5.94	5.94	1978
Citanduy River Basin Development, irrigation, flood control, and reclamation (U.S. AID) ..	—	.62	.62	1975
Karangates Dam II (Lahor Dam), irrigation and hydropower (Japan)	5.63	2.48	8.11	1976
Jakarta Flood Control, Phase II, flood control (Netherlands)	—	3.90	3.90	1975
Pemali-Comal Feasibility Study, irrigation and flood control (IBRD/IDA)	—	.60	.60	1975
Kediri Nganjuk II, irrigation (United Kingdom)	—	1.36	1.36	1976
Wlingi Multipurpose Dam, irrigation, flood control, and hydropower (Japan)	—	20.50	20.50	1976
Kali Surabaya River Improvement (Japan)	—	4.54	4.54	1980
Lower Citanduy Water Control, flood control and irrigation (U.S. AID) .....	.42	.75	1.17	1976
Segara Amakan Reclamation, reclamation (U.S. AID) .....	.36	.90	1.26	1976
Irrigation Dumoga-Gumbasa, irrigation and flood control (United Kingdom)	—	3.89	3.89	1976
Jragung Dam, irrigation and flood control (U.S. AID)	—	.50	.50	1976
Way Umpu and Way Pangubuan, irrigation (Japan)	—	5.72	5.72	1978
Luwu Area Development (U.S. AID)	—	5.54	5.54	1979
Irrigation V (Jatiluhur Extension), irrigation (IBRD/IDA)	—	30.00	30.00	1982
Jatigede Dam, irrigation, flood control, and hydropower (Australia)	—	7.36	7.36	1983
Wonogiri Dam, irrigation, flood control, and hydropower (Japan)	70.00	40.00	110.00	1984
Simple Irrigation, irrigation (U.S. AID)	—	23.70	23.70	1979
Irrigation VI, irrigation (IBRD)	110.00	65.00	175.00	1980
Karangsambung Multipurpose, irrigation, hydropower, and flood control (ADB)	2.40	3.00	5.40	1978
Irrigation VII (Tertiary Development), irrigation (IBRD)	—	—	80.00	—
Irrigation VIII (Rehabilitation), irrigation (IBRD)	—	—	—	—

Source: National Development Planning Body (BAPENAS)

Construction of tertiary canal and drainage systems with related quaternary canals and structures, throughout the area;

Improvement of 200 km of existing drains and construction of 40 km of new drains with related flood protection works;

Twenty pilot projects of about 100 hectares each to demonstrate the benefits of on-farm development;

Upgrading of 305 km of rural roads and construction of 55 km of inspection roads and paths along the irrigation canals;

Construction of office buildings, stores, houses for project management and operations staff, an agricultural development center and six rural extension centers.

Rentang System

Construction of new reinforced concrete dam and irrigation intakes on the Cimanuk river;

Construction of tertiary canal systems with related quaternary canals and structures throughout the project area;

Improvement of about 200 km of existing drains, and construction of about 60 km of new drains to serve a lowlying coastal area of about 30,000 hectares;

Twenty pilot projects of 100 hectares each to demonstrate the benefit of on-farm development;

Construction of six rural extension centers.

Sampean Baru System

Remodeling of the existing weir and intake structure.

Water Supply and Sewerage.—Two departments of the Government share responsibility for national water supply and sewerage: the Department of Public Works and Power and the Department of Health. Within the Department of Public Works and Power, the Directorate-General of Housing, Building, Planning and Urban Development (Cipta Karya) is in charge of urban water supply and sewerage. Within the Department of Health, the General and Sanitary Engineering Division and Directorate of Hygiene and Sanitation are mainly involved in technical advisory services on water quality control, design, construction, and related aspects of environmental sanitation. Cipta Karya, through its Directorate of Sanitary Engineering, is the implementing agency for water supply and sewerage projects, with the functions of project planning and selection; fund allocations; engineering, construction supervision, and in some cases operation and maintenance of water supply systems.

Investment in water supply and sewerage fields has been relatively small in recent years. Investments between 1970 and 1974 totaled \$31.2 million including \$30.2 million for water supply and approximately \$1.0 million for sewerage. During the current plan period, \$186.3 million is earmarked for drinking water and environmental hygiene.

Three significant projects in the drinking water and sanitation field include the Five Cities Water Supply Project funded by the World Bank, the Asian Development Bank-funded Bandung Water Supply project, and the U.S. AID-funded Surakarta Water Supply projects. The Five Cities Water Supply project includes the cities of Malang, Purwokerto, Banyuwangi in Java; Jambi in Sumatra; and Samarinda in Kalimantan. At a total cost of about \$22.8 million, the cities will be provided with piped-water supply. Construction work includes well drilling; construction of river intake facilities, pumping stations, treatment plants, and transmission and distribution facilities; installation of new service connections, public standpipes, and bathhouses; and the improvement of existing services.

The Bandung Water Supply project will involve a total expenditure of \$11.5 million. Construction will include drilling of 22 deep wells, laying of 455 km of transmission and distribution mains; construction of three treatment works with a total daily capacity of about 83,400 cubic meters, three reservoirs with a total capacity of about 18,000 cubic meters, and two pumping stations with a total capacity of 137,400 cubic meters per day; construction of 20 public bathhouses and 200 standpipes; and installation of 13,000 water meters.

The Surakarta Water Supply project involves construction of a 24-inch potable water transmission main for the city. Financing by U.S. AID for 1976 was \$1.5 million.

Housing.—According to Indonesian Government estimates, about 440,000 new houses are required each year, but the nation's capability to construct new housing is only 230,000 units per year. This means that there is a cumulative shortage of 210,000 houses per year including 120,000 houses in rural areas and 90,000 houses in cities. (This calculation is based on an estimated population growth of 2.5% per year.)

The target for construction of new housing during the second plan period by Cipta Karya, the agency responsible for housing, was 315,000 units. However, the planning allocation for this program was only \$58.3 million or an average of about \$185 per unit. As more experience is gained in the public housing field, these projections will certainly be changed to fit financial constraints.

In 1974, the Government formed three bodies to deal with housing problems; these are the National Housing Policy Board, the National Urban Development Corporation (Perumnas), and the Housing Mortgage Bank (BHP).

The National Housing Policy Board is responsible for defining and controlling general policies for the national housing program. Perumnas is responsible for the procurement and construction of houses. BHP is responsible for organizing the collection of capital so that mortgages can be offered to prospective buyers.

Perumnas has already acquired land for low-cost housing in a number of areas of Java. In the Jabotabek (Jakarta-Bogor-Tangerang-Bekasi) area, Perumnas plans to build 25,000 houses. One project in Depok, 10 km from Jakarta, includes 5,000 houses. As of mid-1976, a total of 1,140 houses had been completed. Five different types of houses are being built in the area, from 2-bedroom houses on 100 square meters of land, to 3-bedroom houses on 200 square meters of land. The World Bank has provided \$3.2 million for a 7,000-home, low-cost housing project in the Jakarta Raya-Klender area. One thousand will be built in the first stage, and the remaining 6,000 will be built in the form of core houses with roof, floor, and frame but without walls; the buyer will complete construction.

Perumnas does not actually build houses but subcontracts construction to private contractors. For the Depok Project, for example, the four contractors who won tender bids were P.T. Tenaga Djaya, P.T. Wijaya Karya, P.T. Karya Nusa, and C.V. Mataram.

Progress on developing mortgage financing has been slow. At present, the Housing Credit Bureau of the Bank Tabungan Negara (BTN) is acting as a housing mortgage bank. The Government has allocated \$7.2 million for mortgage purposes.

In an effort to meet current plan targets for housing construction, the Government is providing incentives to foreign and domestic firms to build low-cost housing. Benefits include tax holidays, import duty exemptions, exemptions from examination of capital sources, and exemption from stamp duty on capital and from tax on dividends. Nevertheless, actual implementation of private housing projects has tended to concentrate on upper-income housing because of higher profit margins.

A government survey of housing conditions in Indonesia estimates that about 60% of total housing can be classed as permanent or semipermanent. Of this number some 28% consist of old village-type units in cities, 32% are new village-type units in suburbs, 8% are agrarian villages in suburbs, and

18% are detached huts and slum units. About 14% of the total number of housing units have modern plumbing facilities. Because of the large areas of village-type housing located in and near the larger cities, the differences between urban and rural housing are not great.

The survey indicated that some 73% of rural houses have dirt floors, 68% lack household water, 77% lack bathing facilities, and 88% lack private toilets. In the capital city of Jakarta, of all families living in permanent housing, 30% live in one-room units, 28% in two-room units, 24% in three-room units, 11% in four-room units, and 8% in five-room units. Only about 21% of Jakarta dwellings have electricity, only about 11% have piped-water, and only about 35% have their own bath and toilet facilities.

Construction of the more affluent rural housing units includes brick for walls, cement tiles for floors, and ceramic tiles for roofing. However, a large portion still employs bamboo matting for walls and palmleaf thatch for roofing. In the major cities, modern construction materials and techniques are coming into use for housing with masonry foundations; brick and plaster walls; tile and terrazo floor coverings; prefabricated wood frames and glass for doors and windows; asbestos-cement panels and suspended ceilings; and tile, galvanized iron sheet, and wood shingles for roofing.

In order to reverse the trend toward construction of more and more luxury homes by housing developers, the Government passed a regulation which required developers to build houses at a ratio of one luxury house to three medium-cost and six low-cost houses. However, businessmen have avoided this requirement or reduced their activities.

The rapid development of housing in Indonesia is hampered by generally high construction costs. Housing developers must normally provide their own infrastructure facilities such as roads, water supply, electricity, etc. Even the construction of electricity switchgear facilities have been left to real estate developers.

Harbor Development.—The Directorate-General of Sea Communications within the Ministry of Communications is responsible for harbor construction, improvement, and development. Main harbor projects to be completed during the current national development plan include those at Jakarta (Tanjung Priok), Medan (Belawan), Ujung Pandang, Cirebon, Semarang, Cilacap, and Surabaya. Total expenditures on harbor improvement and construction projects to be initiated during the current plan period are expected to reach over \$500 million. Many of the projects are being funded by foreign loans and grants. For example, in 1975, the ADB

approved a loan for the first phases of the Belawan and Surabaya ports. (For further information on ports and harbors see Transportation.)

Other Government Construction.—In addition to the government construction programs discussed above, there are extensive government construction activities for transmigration, education, health, and military. During the current plan period, the Government plans to move 250,000 families from overpopulated Java to the sparsely populated outer islands. In one prototype transmigration project under consideration, cost estimates range from \$3,000 to \$4,000 per family, and include preparation of necessary infrastructure—access roads, minimum health and education facilities, clearing part of the land, and other inputs, as well as provision of some housing materials to the transmigrants.

The Director General of Primary and Secondary Education stated in 1976 that the Government would provide 525,000 new classrooms for primary education by 1979.

The second national development plan includes \$27.9 million for construction of mosques, churches, and other religious buildings. Planned expenditures for medical care and health services include substantial funds for construction of health centers, hospitals, and clinics.

Many other government programs containing major construction components are described various industry reports. These range from rehabilitation and expansion of airport facilities to the building of grain storage warehouses. Construction of offices and other buildings for government departments is included within total funds allocated in the 5-year plan, but is not usually identified specifically. Specific construction plans are included in the annual budget allocations for each department and activity. In general, State-owned corporations operate with considerable fiscal independence, particularly those having limited liability status (P.T.'s), which operate independently of the national budget. The expansion plans of these firms, many of which involve construction of new facilities, are discussed along with those of private firms in each industry report.

Governments below the national level are also responsible for considerable construction activity. The current 5-year plan includes \$2.2 billion for rural development, village, regency, and provincial aid programs. In addition, there are per capita payments by the National Government to local government units based on the "Inpres" (Presidential Decree) program which are frequently used to finance construction projects. Also, local jurisdictions support construction programs through locally collected levies such as the provincial and regency "Develop-

ment Taxes." The annual budgets of provincial and lower level government units usually include funding for specific projects.

Private Construction.—Construction activities in the private sector tend to be concentrated in small projects as compared to the government-funded undertakings. However, there are some large private projects for construction of office buildings, hotels, and industrial complexes. The most significant private construction activity is in connection with approved foreign capital investment projects, although there is considerable small-scale domestic residential and commercial construction which is not under approved investment project status. Some indication of residential and commercial investment is given by the level of project approvals in these fields. As of December 31, 1975, total approved foreign investment for real estate, tourism, construction, and contracting reached \$440.4 million for 97 projects. Approved domestic investment in hotels and tourism totaled 104 projects valued at \$192.2 million, and 13 projects valued at \$222.7 million had been approved in real estate and housing. New construction projects for which applications were made in 1975-76 are listed in table 4.

GROWTH PROSPECTS

In 1976 construction activities in the private sector slowed as a result of the Pertamina financial problems and its cutback in expenditures. In the Government sector a number of programs were delayed or eliminated. However, despite these changes, knowledgeable industry sources believe that construction activity will not decline substantially over the next few years.

In 1976, funding for highways and bridge construction was maintained at planned levels, but projects were reduced in scope to compensate for inflation. For the remainder of the 5-year planning period to 1979, some shortfall in accomplishments is likely, both in road improvements and new road construction.

In the private sector, the prospects for continued growth in construction activity are good. Several large private construction projects have recently been completed, and a wide range of related infrastructure projects are proceeding for construction of homes, shops, hotels and other similar facilities.

MARKET SIZE

The Indonesian market for construction equipment and building products was \$438 million in 1975, and it is expected to increase to \$464 million

Table 4.—Indonesia's Construction Projects, Investment Applications, 1975-76
(in millions of U.S. dollars)

Investor	Location	Authorized Capitalization	Description
Foreign			
Far East Building Establishment, Liechtenstein, joint with P.T. Terminal Builders Ltd. and Mr. N.H. Musry	Jakarta	2.5	Construction of office space
Venture Ltd., United States, joint with P.T. Herda Consultant Indonesia	Yogyakarta	2.5	Construction of industrial park
Ohbayashi Gumi Ltd., Japan, joint with P.T. Metropolitan Divindo	Tangerang, W. Java	9.0	Construction of housing
Investment Consolidated Ltd., Hong Kong, joint with P.T. Regional Engineering and Aluminum ...	Jakarta	5.5	Construction of housing
City Engineering and Estate and Property Ltd., Hong Kong, joint with P.T. City Cipta Indonesia	Jakarta	1.0	Subsoil engineering and foundation and water works
Hooker Indonesia Development Pty. Ltd., Australia, joint with P.T. Pioneer Trading Co.	Bogor, W. Java	8.0	Construction of housing
Shang Hang Estate Ltd., Hong Kong, Joint with Bali Diamond Corp.	Jakarta	3.0	Construction of housing
Beca Carter Holdings, Ltd., New Zealand, joint with P.T. Herda Consultants	Jakarta	.4	Engineering consulting
McConnell Dowell Ltd., New Zealand, joint with C.V. Graha Sarana Engineering	Jakarta	.5	Special contracting
Owens Illinois Inc., United joint with P.T. Herda Consultant	Jakarta	.4	Consulting
Societe de Controle Technique et D'Expertise, France, joint with P.T. Biro Insinyur Exacta	Jakarta	.2	Consulting
Transcamp Ltd., Hong Kong, joint with N.V. Mugi ..	East Java	1.0	Assembly of prefabricated housing units
Japan Development Construction Ltd., Japan, joint with P.T. Trusakti Surya and P.T. Grand Tema	Surabaya, E. Java	.5	Special contracting
Kajima Corp., Japan, joint with P.T. Waskita Karya ..	Jakarta	.5	Special contracting
VSL Prestressing Pty., Australia, joint with P.T. Capitol Mutual Corporation	Jakarta	1.2	Special contracting
Daito Kogyo Co. Ltd., Japan, joint with P.T. Waskita Karya	Jakarta	.5	Special contracting
Domestic			
P.T. Wisma Mukti	Surabaya, E. Java	3.0	Construction of housing
P.T. S. Widjojo	Jakarta	10.2	Office building construction
P.T. Puteraco Indah	Bandung, W. Java	2.6	Construction of housing
P.T. Jakarta Setaiabudi Property	Jakarta	7.1	Construction of housing
P.T. Multi Plaza Property	Jakarta	19.2	Construction of housing
P.T. Borobudur Continental	Jakarta	14.5	Office building construction
P.T. Surabaya Industrial Estate	Surabaya, E. Java	12.7	Industrial estate construction
P.T. Bali Beach Hotel Bowling Center	Bali	.1	Bowling center construction
P.T. Gesit Agung	Medan, Sumatra	8.4	Construction of housing
P.T. Pembangunan Sumbar	Padang, Sumatra	1.1	Construction of housing
P.T. Swadaya Agung Perkasa	Jakarta	1.4	Construction

¹ Through March 31, 1976.

Source: Capital Investment Coordinating Board.

in 1976. By 1980 the market should rise to \$872 million (see table 5).

The largest portion of the 1975 market consisted of building products with sales of about \$279 million. This category includes such products as cement, bricks, tiles, nails, and pipe. About 68%, or \$190 million, of the building products category was supplied by Indonesian production, primarily of cement, roof tiles, and steel reinforcing bars. Of the 1974 market valued at \$245 million, 67% or about \$165 million was locally produced. Imported building products in 1974 (year of latest available data) covered a wide range of finished and raw materials (table 6).

The makeup of imports is expected to change

considerably in future years as local production of cement and metal building products replaces imported goods. Local production of air-conditioning equipment will also result in a reduction of imports, especially of window/wall unit types.

In the market for construction equipment, total 1975 sales of construction tractors amounted to about \$72 million, while excavating and leveling equipment sales were \$31 million; loading and lifting equipment sales, \$11 million; concrete and building products production equipment sales, about \$4 million; road roller sales, \$4 million; and other construction equipment sales, including concrete and asphalt paving equipment and powered hand tools, etc., \$37 million.

Table 5.—Indonesia: Size of Market For Construction Equipment and Building Products
(in thousands of U.S. dollars)

	1973	1974	1975	1976	1980
Tractors for Construction					
Imports					
United States	21,050	34,230	43,560	46,500	65,100
Japan	10,780	17,440	22,500	—	—
United Kingdom	1,490	1,220	2,170	—	—
West Germany	670	1,880	2,220	—	—
France	150	900	720	—	—
Canada	30	800	660	—	—
Others	300	400	540	—	—
Market Size	34,470	56,870	72,370	77,600	115,790
Excavating and Leveling Equipment					
Imports					
United States	10,950	16,600	18,520	20,800	36,000
Japan	3,450	7,500	9,760	—	—
West Germany	220	960	980	—	—
Canada	20	590	350	—	—
France	90	560	640	—	—
United Kingdom	470	550	360	—	—
Others	300	420	600	—	—
Market Size	15,500	27,180	31,210	33,840	61,160
Road Rollers					
Domestic Production ...	400	1,600	2,900	3,300	4,000
Imports					
United States	160	500	200	100	100
Japan	1,900	1,300	1,200	—	—
West Germany	280	200	100	—	—
United Kingdom	260	110	50	—	—
France	—	90	—	—	—
Sweden	—	40	—	—	—
Others	15	15	20	—	—
Total	2,615	2,255	1,570	1,250	750
Market Size	3,015	3,855	4,470	4,550	4,750
Loading and Lifting Equipment					
Imports					
United States	2,000	2,900	3,400	3,500	6,400
Japan	2,400	3,300	3,800	—	—
West Germany	420	1,000	1,500	—	—
Netherlands	440	600	700	—	—
United Kingdom	330	430	450	—	—
Italy	80	300	200	—	—
Others	400	480	500	—	—
Market Size	6,070	9,010	10,550	11,390	19,600
Concrete and Building Products Production Equipment					
Domestic Production ...	—	—	150	200	500
Imports					
United States	520	1,550	2,300	2,600	4,000
Japan	215	830	1,160	—	—
West Germany	110	120	350	—	—
Netherlands	100	110	130	—	—
Australia	60	80	90	—	—
United Kingdom	50	70	80	—	—
Others	120	130	120	—	—
Total	1,175	2,890	4,230	4,780	9,230
Market Size	1,175	2,890	4,380	4,980	9,730
Other Construction Equipment ¹					
Imports					
United States	4,900	8,260	13,000	14,200	26,000
Japan	5,800	14,500	12,000	—	—
West Germany	1,120	3,100	3,600	—	—
Netherlands	1,090	1,900	3,500	—	—
Canada	510	850	1,100	—	—
United Kingdom	380	1,220	1,500	—	—
Others	2,000	2,670	2,100	—	—
Market Size	15,800	32,500	36,800	39,700	71,700

Table 5.—Indonesia: Size of Market For Construction Equipment and Building Products—Continued
(in thousands of U.S. dollars)

	1973	1974	1975	1976	1980
Construction and Building Products					
Domestic Production ...	158,000	165,000	190,000	210,000	500,000
Imports					
United States	7,800	9,800	14,000	15,700	19,800
Japan	22,900	30,000	38,000	—	—
Singapore	4,300	8,400	7,200	—	—
Australia	3,800	5,800	6,000	—	—
West Germany	3,000	5,200	5,300	—	—
Italy	1,900	2,900	3,200	—	—
Others	18,000	18,500	16,500	—	—
Total	61,700	80,600	90,200	84,100	99,800
Exports	—	500	1,500	2,000	10,000
Market Size	219,700	245,100	278,700	292,100	589,800
Total Market Size	295,730	377,405	438,480	464,160	872,530

¹ Other construction equipment includes concrete and asphalt paving equipment, powered hand tools, and other equipment not classified elsewhere.

Source: Official Indonesian and supplier-country statistics, and estimates based on trade source interviews.

Table 6.—Indonesia: Imported Building Products and Materials

Commodity	1970	1971	1972	1973	1974
Cement	12,961	16,966	21,975	32,765	68,339
Concrete steel & wire rod					
hot rolled	12,132	14,074	12,776	11,032	17,716
Profile iron & similar	5,608	11,846	11,227	19,902	35,506
Asbestos, fibre cement, eternite, asbestos ridges, & manufactures of asbestos	1,597	2,084	3,467	4,966	6,804
Electric conductor wires, stranded wires, of steel, copper, aluminum & its alloys	4,048	3,980	5,676	6,038	9,483
Cables: Underground cables, sea cables, telephone cables & insulated wires ..	8,928	9,706	11,420	17,752	30,226
Veneers & plywood	501	872	1,424	2,206	3,117
Brick	0.4	1	0.5	4	90
Roofing tiles	0.1	0.2	0.1	24	12
Porcelain pipes & fittings...	25	24	4	25	64
Floor & paving tiles	38	193	30	773	513
Building refractory brick ..	800	880	2,037	3,432	3,926
Canvas & similar	695	670	516	516	248
Marble & similar	334	470	1,312	162	966
Crude gypsum, plaster of Paris & similar	364	389	1,058	773	1,442
Lime & limestone	26	27	22	272	276
Wall & furniture tiles, mosaic cubes, etc.	389	410	313	780	1,066
Window glass, colored uncolored transparent, & similar	2,142	2,216	2,196	4,568	4,644
Glass tiles for roofs, floor, paving & wall	12	4	13	240	398
Wall mirrors, glass millars, etc.	36	66	83	137	203
Floor & paving tiles of natural stones	16	25	4	36	17
Manufactured items cement, concrete & artificial stones	19	32	279	345	677
Milled steel	44	61	120	3,928	4,424
Round, square, rectangular and flat iron	5,480	4,316	8,008	114	1,276
Barbed wire and similar	232	433	720	93	258

Table 6.—Indonesia: Imported Building Products and Materials—Continued

Commodity	1970	1971	1972	1973	1974
Manufactured cork for construction and insulating	30	21	37	20	104
Wood tar, wood tarpitch, and similar	59	57	17	59	74
Earth colored	23	32	53	98	54
White lead	2	0.6	0.4	11	4
Red lead	85	91	82	130	182
Iron oxide	52	66	287	171	287
Rolled, forged & pressed steel plates, tinned, corrugated, perforated, etc.	4,714	5,297	7,715	13,002	23,373
Galvanized roofing sheets ridges, gutters, & similar	233	500	411	1,031	1,329
Framework of buildings, doors & windows, roofs of iron & iron alloys....	5,636	10,485	12,073	29,380	35,983
Wire nails, tack, spikes of steel & steel alloys	229	250	310	5,349	1,893
Sawn wood, lengthwise, or squared, improved	165	21	56	98	48
Screws, clamps, hooks, nuts, washers, frame of anchors & similar	636	956	1,439	629	1,099
Locks, padlocks & similar ..	1,271	1,104	1,906	1,632	2,023
Bulbs, tubes, arc lamps, T.L. & similar, for indoor & outdoor lighting & lamp-holders	1,515	836	841	2,885	3,641
Union pipes, installation pipes, connection fittings, junction boxes, plugs, sockets, etc..	539	180	305	1,795	2,814
Switches, circuit breaker regulating apparatus, & the components	4,301	7,421	10,620	8,507	13,241
Enamelled sanitary articles & common sanitary articles	193	2,328	503	1,079	976
Refrigerators, air conditioning units semi-assembled units & parts	5,404	6,298	9,762	12,834	20,280
Insulators	224	512	347	1,007	1,794
Instruments for the measurements & check of electric energy	890	980	1,378	4,745	6,240
Starch	33	56	149	266	684
Iron, steel, lead alloy, zinc alloy, pipes, plumbing pipes, fittings & its accessories ..	21,147	20,453	34,710	62,458	81,487
Glues: bone glue, hide & fish glue, & similar	886	1,100	1,561	2,121	2,579
Zinc white	422	312	438	1,156	1,854
Other not prepared mineral colored	4,628	4,875	6,438	1,357	1,853
Liquid & solid sicatives and varnishes	284	215	547	2,692	3,495
Mastics	83	138	202	403	404
Cleansing, polishing & similar preparation	586	532	936	255	262

Source: Central Bureau of Statistics.

Imports

U.S. manufacturers lead in the supply of tractors for construction. In 1975, U.S. suppliers had a 60% market share while Japanese suppliers had the second position with a 31% share. By 1980, Japanese suppliers are expected to gain slightly, while U.S. suppliers are expected to retain their lead.

In the market for excavating and leveling equipment, U.S. suppliers also lead with a 1975 share of 59%, followed by Japanese suppliers with 31%. In 1980, U.S. suppliers are expected to retain this leading position.

U.S. suppliers had a leading 32% share of the market for lifting and loading equipment in 1975, while Japanese manufacturers had a 36% market share and West German companies a 14% share. Little change in these market shares is expected through 1980.

Domestic manufacturers are gradually taking a larger share of the market for road rolling equipment. In 1975 over half of the market was supplied by Indonesian manufacturers, while Japanese suppliers were second. By 1980, domestic suppliers are expected to have an 84% share of the market for this equipment.

Indonesian production of building products is expected to increase rapidly in future years as plant expansions are completed for production of cement, steel, and other materials. Imports of building products already show a declining growth rate trend, and this trend is shown in the following table:

Years	Percent Change in Value	
	Imports	Domestic Production
1973 to 1974	31	4
1974 to 1975	12	15
1975 to 1976	-7	11
1976 to 1980	19	138

In 1975, of the \$279 million building products market, \$89 million was supplied by imports. The Japanese were major suppliers with a 42% share of the import market followed by U.S. suppliers with a 16% share. Singapore, West Germany, Australia, and Italy are other leading supplier countries. Indonesian manufacturers are expected to supply 85% of total building products sales by 1980. No substantial imports of cement are estimated in 1980, since domestic producers are expected to have sufficient capacity to supply the entire market by that year.

Domestic Manufacturing

Indonesian production of building materials and products covers a wide range and includes: tiles, asphalt, plastic pipe, asbestos, cement materials, granite, bricks, sanitary porcelain items, aluminum extrusions, concrete steel reinforcing bars, steel pipe, galvanized iron sheeting, and window glass.

Cement production is growing rapidly. Between 1970 and 1975, output grew from 568,100 tons to 900,000 tons; it is expected to rise to 5.1 million tons per year by 1980. Production of such related

building materials as cement asbestos panels and pipes has been stimulated by this rapid growth.

In production of clay and ceramic building materials, local manufacturers make roof and floor tiles as well as sanitaryware. As part of its efforts to improve building materials supply, the Government has established a brick production plant in Semarang; wood drying plants in Jakarta, Surabaya, and other parts of West Java, and Bali; lime kilns in Central Java; a particle board factory with a 3,000-ton daily capacity in Cibadak, West Java; and a concrete block manufacturing plant.

In 1974 the British Government granted \$80,000 financial assistance to Indonesia for the establishment of a pilot factory to produce concrete panels in Jakarta. The factory, under the control of the Directorate-General of Housing and Urban Development (Cipta Karya), was completed in 1975 with a production capacity of panels sufficient to build a four-story unit of apartments each day. The experimental factory was used to build 40 houses for demonstration purposes.

Indonesian porcelain sanitaryware products face severe competition from Japanese, Chinese, and other imported goods.

Three factories in Indonesia produce refractory bricks, mainly of the Chamotte type. They are located in Bandung, Mayong Kudus (Central Java), and Surabaya (East Java). Although local supplies of Chamotte-type bricks are low in price, users tend to prefer imported bricks because their quality is better and their supply is more reliable. Ceramic roof tiles are manufactured throughout Indonesia in local factories using hand labor. Modern brick and roof tile industries are developing and starting to replace the traditional brick kilns. The modern factories produce more uniform and higher quality bricks used in urban construction, but in rural areas the use of traditional roof tiles, brick, and clay pipe will survive for many years because of low prices.

There is good growth potential for production of marble and other mineral building materials in Indonesia. Recent studies in West Sumatra, for example, show that the Sumpur Kudus area of Sawahlunto has one of the largest marble rock reserves in Asia, with an estimated 500 million cubic meters of rock and stone and a potential output of 95 million cubic meters of marble. The estimated Indonesian production for 1976 is only 30,000 to 40,000 cubic meters of marble, and this could be increased substantially. Granite production in 1975 was about 1 million tons valued at \$4.6 million. For 1980, granite production is forecast at 2.4 million tons valued at \$12.6 million. At the present time most granite is employed in aggregates although

there is growing use of it for facings and decorative applications.

Indonesian production of asbestos cement building materials was begun in 1976. Nonpressure 100-mm to 600-mm asbestos cement pipe is now being produced in East Java by a subsidiary of P.T. Semen Gresik. Capacity of the plant is 20,000 tons per year. The firm plans to produce pressure pipe in the future. P.T. James Hardie Indonesia, a joint venture between Indonesian and Australian interests, started production of asbestos cement pipes and building materials in Tangerang, West Java. Estimated cost of the project was \$20 million. By mid-1976 the firm was producing 80-mm to 400-mm diameter asbestos cement pressure pipe. Plant capacity is 30,000 tons per year. PVC pressure pipe is manufactured from imported resins at several Indonesian plants in sizes up to 75 mm.

In addition to asphalt obtained from the Pertamina oil refineries, the government-owned asphalt company P.N. Sapal, Surabaya, East Java, produced 120,000 tons in 1975, and it is planned that this production will increase to about 360,000 tons per year by 1985.

In 1975 the production of aluminum extrusions began in Indonesia with capacity of 4,000 tons per year. Indonesian production of concrete steel reinforcing bars is rising. Between 1970 and 1975, output grew from 4,500 tons to 115,000 tons, and it is expected that future production will satisfy most of the nation's requirements.

Galvanized iron sheeting is a common building material in Indonesia for roofing, and production has expanded considerably in recent years. Indonesian production of iron and steel pipe expanded from 1,900 tons in 1970 to 94,000 tons in 1975. Present output is able to meet local requirements for common steel pipe, but Indonesia depends on imports for high-pressure and special-application pipe.

Total Indonesian production of sheet glass is not reported, but the major producer, Asahimas Flat Glass Ltd., in Jakarta, has a capacity of 27,900 tons per year.

Manufacture of plywood in Indonesia has increased rapidly in recent years. The industry only began to develop in 1970, and prior to that time only a small amount of plywood was used. Some plywood is still imported, mainly from Singapore and Taiwan. In 1973 imports were 6,042 metric tons valued at \$2.2 million, and in 1974 they amounted to 5,990 MT valued at \$3.1 million. Plywood imports are continuing to decrease, and in 1975 they amounted to 4,000 MT valued at \$2 million.

About 85% of all window/wall air-conditioning units sold in Indonesia are locally assembled. In 1970 output was 4,500 units, and by 1975 production had expanded to 25,000 units.

Indonesian production of construction equipment mainly consists of road rollers, concrete mixers, and rock crushers. Two firms in Indonesia are producing road rollers of 6 to 10 tons, P.T. Barata and P.T. Sakai Sakti. The latter firm is a joint venture between Sakai of Japan and an Indonesian firm. Output of road rollers in 1973 was 2,500 tons, while in 1975 output was 3,500 tons, which constituted 145 machines. P.T. Barata recently began production of mobile rock crushers with 5 cubic meters to 13 cubic meters per hour output. Although initial sales of these units have been slow, it is expected that demand will gradually rise. Small concrete mixers are being produced in Indonesia. Production in 1975 was estimated at 500 units.

MARKET OPPORTUNITIES

Excellent market opportunities in Indonesia exist for a wide range of construction equipment and building products. Notable among items with high sales potential are tracked tractors, bulldozers, wheel loaders, large dump trucks, road building and repair equipment, cutter dredges, hydraulic excavators, mobile cranes, asphalt and aggregate mixing plants, builders' hardware, insulation materials, and central air-conditioning equipment. There is also a need for construction technology and services, particularly for the design and management of large-scale projects.

Tidal swamp reclamation work underway and planned in Indonesia will require substantial equipment such as cutter dredges and hydraulic excavators. The technique for land reclamation involves enclosing large areas of tidal flatlands with protective dams, allowing trapped water from the enclosed area to drain at low tide, and allowing fresh water to come in and leach salt from the earth. After the leaching process is completed, the land is excellent for rice cultivation, since there are few problems of contour correction or clearing of vegetation. Table 7 lists equipment requirements for the tidal swamp reclamation project as planned by the Ministry of Public Works and Electric Power. Total value of equipment required will be about \$100 million.

In light of the government's ambitious road building and repair programs, road building equipment has good sales potential. In addition, private firms in forestry and mining will require equipment to construct roads in remote areas. The types of equipment required in Indonesian road building programs can be found in the acquisition list of the Direc-

torate-General of Highways under a 1975/76 U.S. Export-Import Bank loan program shown in table 8.

Asphalt and aggregate mixing plants are being used by the Department of Public Works and Power as well as by private contractors. For many large projects such as refinery, fertilizer, and LNG plant construction, mixing plants are built at the construction site.

For large construction projects, onsite concrete batching plants are also often built. For example, at the Arun LNG plant construction site, a complete concrete batching plant with an hourly capacity of

Table 7.—Indonesia: Tidal Swamp Reclamation Project Equipment Requirements, Department of Public Works and Electric Power

No. of units	Description	\$ Million
155	Cutter dredges 12 inch, 250 cubic meter/hour.....	60.2
165	Hydraulic excavators	16.9
16	Floating workshops	1.2
6	Fixed workshops and docking	1.8
16	Tankers, 30 ton	3.1
8	Tugs	1.2
32	Dredge tenders	1.7
50	Inspection Boats	0.6
12	Mobile cranes, 12 ton	1.2
12	House boats, 40 ton	0.6
300	Barges	1.4
70	Motor vehicles (jeeps, trucks, pick-ups)	1.2

Source: Department of Public Works and Electric Power.

Table 8.—Indonesia: Acquisition Program for U.S. Export-Import Bank Equipment Projects

Description	Manufacture Model	Quantity
Bulldozer 140HP Angling Blade ..	Caterpillar D6C	55
Bulldozer 180HP Angling Blade ..	Caterpillar D7G	55
Ripper for Dozer 180HP	Caterpillar 7D	10
Wheel Loader 1.3M ³	Caterpillar 920	70
Motor Grader	Caterpillar 120G	28
	Caterpillar 130G	15
Vibratory Compactor	Ingersoll Rand SP-54	25
	Ingersoll Rand SPF-54	5
Dump Truck 15 ton	—	—
Compressor 16m ³ /min	Ingersoll Rand DR600	25
Jackhammer	Ingersoll Rand J-40	100
Stone Crusher 70 ton/h	Universal	6
	Lippmann	14
Pick-Up 1.5 ton	IH (2x4) Scout 11XLC	113
Service Truck 2.5 ton	IH (4x4) Scout 11XLC	100
Fuel and Lube for Truck	Lincoln	50
Dump Truck 5 Ton	IH Loadstar 1850	779
Dump Truck 10 Ton	—	—
Flat Bed Truck	IH Loadstar 1750	158
Asphalt Mixing Plant	Barber Greene BC-30	1
Asphalt Distributor 4,000 ltr.	Etnyre BT-HS Mounted on Mach R492-P	17
Water Tank Truck 4,000 ltr.	IH Loadstar 1850	39
Fuel Tank Truck 4,000 ltr.	IH Loadstar 1850	30
Truck Crane 5 Ton	Drott 85 RM 2 Case	25
Asphalt Paving Machine	Barber Greene SA-41	1
Aggregate or Soil Mixer	Seaman TO-7 30.H	15
Asphalt tank, 12,000 lt.	—	—
Roller Tandem 12 ton	Gallion DD-353	50

Source: Directorate-General of Highways.



Road improvement in Jakarta is a part of the 5,000 kilometer rehabilitation program contained in the Second Five-Year Plan.

200 cubic yards was imported from the United States.

According to one government official, asphalt emulsion plants are planned for every provincial capital in Indonesia. In the first stage, three plants will be constructed—one in Medan, Sumatra; one in Ujung Pandang, Sulawesi; and one in Menado, Sulawesi. At present, asphalt is shipped to the outer provinces from Jakarta, where the bulk of production takes place. The new plants will thus provide the outer provinces with their own supply of emulsion. Planned capacity of the plants is about 20 tons per day.

The trend in sales of air-conditioning equipment is toward more central and package units as construction moves into high quality and larger buildings. There will thus be a growing market for large chillers and air handling units. In addition, air-conditioning accessories such as filter systems will find a growing market.

Indonesian refractory brick imports have grown in recent years with the increasing construction of

steel mills, sugar mills, foundry facilities, and fertilizer plants. In 1974, imports of refractory bricks were over 14,000 tons, valued at \$3.7 million.

Fiberglass and asbestos insulation materials and ceiling panels have a growing market in Indonesia. According to trade sources, insulation material sales in 1975 were valued at over \$2 million. With the growing use of air-conditioning, sales of insulation materials should increase considerably in future years. In addition, for large industrial construction projects in the petrochemical and fertilizer fields, substantial amounts of insulation materials for high temperatures are required. These include insulation materials of calcium silicate, perlite, and other mineral fibers.

Although labor is cheap in Indonesia, there is a growing market for powered handtools. Many Indonesian contractors are beginning to realize their long-term economies, and both electric and pneumatic powered handtools are growing in use. Associated with the latter is the growth of air compressor sales.

Builders' hardware sales are growing in Indonesia. Nuts, bolts, and screws are produced in Indonesia, but the bulk of hardware, such as hinges, knobs, locks, and a multitude of other fixtures, is imported. As housing is improved, the demand for imported builders' hardware items will increase correspondingly.

One major problem in Indonesia's low-cost housing program is the shortage of many building materials. To reduce construction costs prefabricated window frames and roof structures are being used. Frames of two-story houses are being made of special steel profiles which are manufactured in Indonesia. Use of modern building materials is often relatively expensive, since workmen are not yet accustomed to using them, and work often proceeds slowly.

Although particle board and asbestos cement sheets and roofing are being produced in Indonesia, there is a continued demand for low-cost building materials of all types. Hollow cement blocks are now being made from volcanic materials and lime, but the quality is poor. In view of the rapidly expanded cement production planned for the coming years, equipment to produce not only concrete block but also concrete tiles, concrete pipe, and other items will have good sales potential. Cement and terazzo tile is being produced in many small factories, and some cement roofing tiles are produced in North Sumatra.

There is need for wood preservation methods which are more efficient and economical than those currently in use. Wood preservatives now used in Indonesia are: creosote mixtures, water-borne preservatives, and oil-soluble preservatives. Poles, railway ties, pilings, structural timber and some parts of industrial buildings and houses are creosoted. Although creosote is low in cost, it is not suitable for many construction needs. While oil and water-borne preservatives in use tend to be toxic and high in cost. Of particular interest would be chemicals to preserve bamboo, which is a widely used housing material in Indonesia.

There are good sales opportunities for the introduction of methods, materials, and equipment for more efficient production of clay products, such as tiles, pipes, and similar building materials. Although tiles and bricks are being produced in small, inefficient kilns operated by families or on a village co-operative basis, demand for higher quality products exists.

IMPORT PROCUREMENT

Buyers Universe

The largest single users of construction equipment and building products is the Indonesian Government. The Department of Public Works and Electric Power (Jl. Pattimura 20, Kebayoran-Baru, Jakarta) is the organization most concerned with construction projects, although other departments are also involved.

The Directorate-General of Sea Communications within the Department of Communications (Jl. Merdeka Timur 5, Jakarta) is responsible for port improvement and construction.

The Jakarta City Government has substantial construction and public works responsibilities; its address is: Jakarta Municipality Administration, Jl. Medan Merdeka, Selatan, Jakarta.

Government purchasing of construction equipment or large quantities of building materials is normally done by open tender procedures. Each Directorate-General conducts its own purchasing. For example, in the Directorate-General of Water Resources, a Tender Committee reports directly to the Assistant Director General of Water Resources. The Directorate of Materials and Logistics coordinates the preparation of purchase specifications with the functional directorate concerned, draws up bid specifications, formulates a list of eligible contractors or bidders, and mails out invitations to bid. Final decisions regarding bid award are made by the Tender Committee. It is thus necessary for firms wishing to sell equipment to the Ministry of Public

Works and Electric Power to contact functional departments as well as the materials and logistics departments.

The Directorate of Housing, within the Directorate-General of Construction, does no construction itself, but supervises the work of Perumnas (Perusahaan Umum Pembangunan Perumahan Nasional), the government-owned housing corporation. Inquiries regarding equipment and material sales should thus be addressed to Perumnas at Jl. Iskandansyah 65-C, Kebazoran, Baru.

The Directorate-General for Highway Construction purchases most of its own equipment for road maintenance and rehabilitation, but new road construction is normally contracted to private firms who purchase needed equipment themselves. For example, in its road building contract, Hyundai Construction purchased and imported trucks, bulldozers, and other equipment. In such cases the equipment is imported free of import duties but must be reexported when the project is completed, or duty must be paid on the residual value if the equipment is sold in Indonesia.

In order to assist local contractors who are unable to finance equipment purchases for road building and other projects, the Directorate-General of Highways leases and sells equipment. If an Indonesian company obtains such a contract, it may obtain the equipment from the Directorate on a lease or hire purchase arrangement. The equipment is paid for by the contractor in the form of completed project work.

The Directorate-General of Sea Communications has a number of harbor building and improvement projects which will require a considerable amount of dredging and excavating equipment. Normally contracts for these projects are let to firms who in turn supply the machinery required. For example, in 1975 the Directorate-General signed a contract with the Japan Industrial Land Development Company to dredge a channel of 200-meters width for a distance of 14.3 km in the Barito River of South Kalimantan. The contract involved removal of 6 million cubic meters of mud and debris and was financed by a \$9 million project aid fund from Japan in addition to \$1.2 million from the Government of Indonesia. In such cases, equipment purchased is normally "tied" to the donor country.

The Jakarta Municipality Administration maintains its own staff of architects and engineers, owns and leases construction equipment, contracts for construction of new buildings and other projects, and supplements the Department of Public Works and Power's activities within the municipality.

Indonesian construction firms normally purchase their equipment and supplies from suppliers or sales

agents based in Jakarta. Foreign contractors located in Indonesia make purchase decisions in consultation with the home offices. It is thus important in making sales proposals to foreign construction contractors that both local and home office purchasing departments be contacted.

Purchase decisions for building materials often involve the client or building owner and his engineering or architectural consultants. Consulting engineers in Indonesia are gradually playing a more important role in purchase decisions. For example, mechanical engineering consultants now often advise clients on proper air-conditioning designs and equipment choices, whereas previously such decisions were left to the general contractor.

Foreign Suppliers Universe

Japanese manufacturers are the leaders in supplying Indonesia's needs for both construction equipment and building products. Leading Japanese suppliers include: Komatsu (heavy equipment), Kimco (loaders), Isuzu (dump trucks), Hino (dump trucks), Sakai (stone crushers), Nikko (asphalt mixing plants), and Tanaka (asphalt mixing plants).

Although Japanese construction equipment is considered to be less durable than U.S.-built equipment, many contractors plan no more than 2 years in advance and thus are willing to purchase lower-cost Japanese machinery. Japanese suppliers extend more liberal and flexible credit terms than nearly all other suppliers, and buyers are often attracted to Japanese equipment even though they may prefer other products in terms of quality.

Sales of Japanese building products are high partly because they are promoted by active and aggressive advertising campaigns mounted by Japanese trading firms, but also because much Japanese investment in Indonesia includes construction of buildings, factories, and other facilities. Normally the Japanese owners of these facilities specify Japanese materials. In addition, the large Japanese trading firms, such as C. Itoh, Mitsui, and Mitsubishi, are actually both end users and suppliers of building products; they invest in factories and other facilities while acting as agents for Japanese suppliers of construction products. Sourcing thus tends to be internal.

A number of European firms have strong market positions in specific equipment categories. For example, large dump trucks made by Aveling Barford of the United Kingdom are used for off-road tasks. Wheel loaders and excavators from the British firm JCB are also widely used.

British suppliers of construction equipment have traditionally strong market positions in Singapore

and Malaysia and thus have a strategic base from which to launch sales campaigns into Indonesia. Also, Indonesians have been introduced to British equipment from the sale of used equipment in nearby Singapore and Malaysia.

Marketing Factors

Construction equipment and building products enter the Indonesian market through two major distribution routes: direct from overseas suppliers to users in Indonesia, or from overseas suppliers to local agents and then to the users. Normally, for large industrial construction projects such as fertilizer plants or petroleum refineries, the contractor orders equipment and materials directly from overseas suppliers. For smaller projects and routine construction activity, importing is done through local sales representatives.

Many suppliers of construction equipment and materials use Singapore as a distribution point for Indonesia, and several Indonesian sales representatives have established offices and warehouses in Singapore for this purpose. By bringing equipment and spare parts into duty-free Singapore and shipping to Indonesia as it is sold, suppliers can realize considerable savings in Indonesian advance import duty fees. Duties on construction equipment and building materials not manufactured in Indonesia range from 10% to 25% ad valorem. It is also easier to ship from Singapore to many parts of Indonesia because of Singapore's proximity to areas of Sumatra and Kalimantan, and its well developed transportation system. Suppliers of construction equipment with spare parts depots in Singapore serving the Indonesian market include Caterpillar, Terex (General Motors), Fiat-Allis, and Komatsu.

The availability of spare parts and service facilities are very important factors in construction equipment purchase decisions. Major suppliers have spare parts depots or service facilities on each of Indonesia's larger islands. For example, P.T. Trakindo Utama, the Caterpillar agent, has its main office in Jakarta with branches in other parts of Java, Sumatra, Kalimantan, and the Moluccas. On Sumatra, branches are located in Medan, Pekanbaru, Jambi, Padang, Palembang, and Telukbetung; on Java, at Merak and Surabaya; and on Kalimantan, at Banjarmasin, Balikpapan, Samarinda, and Tarakan. A branch office at Ternate services the Moluccas.

Important firms establish branches depending on job requirements and will often set up a spare parts and service branch in a particular area if a customer obtains a large construction contract and requires service for a fleet of machines. For example, Trakindo Utama established a branch office in Aceh

when the LNG project was started there, and its Padang branch and workshop were established to service the construction company which obtained the Trans-Sumatra highway contract.

Indonesian construction contractors are often in need of long-term credit. For example, one contractor who was awarded a large highway contract required \$3 million in financing to purchase asphalt mixing equipment, loaders, finishers, and other equipment. Suppliers able to offer financing of 24 to 40 months were able to make the sales.

Leasing or renting of heavy equipment for construction is common in Indonesia, as many contractors are too small to have their own construction fleets. Contractors lease equipment from private leasing firms and also from the Department of Public Works and Power, the Jakarta Municipality Administration, the Army, and occasionally from larger contractors.

One of the most active commercial construction equipment leasing and rental firms in Indonesia is P.T. First Indonesian Plant Hire, a joint venture between the Sime Darby Group (the owner of Caterpillar agencies in Southeast Asia), P.T. Tri Usaha Bhakti (a firm owned by the Indonesian Army), and Richards Wallington Industries Ltd. (an international crane and plant hire organization). P.T. First Indonesian Plant Hire has its head office in Jakarta, a branch office in Balikpapan and its workshop at the P.T. Trakindo Utama office in Jakarta. Equipment leased or rented includes bulldozers, wheeled loaders, graders, high-speed compactors, hydraulic and track excavators, electric generators, cranes, and compressors.

Considering leasing trends, a representative of one large contracting firms stated that he leased 70% of his heavy construction equipment and purchased 30%. Another large contractor stated that he had almost 200 pieces of construction equipment including 5 cranes, 10 building hoists, 33 concrete mixers, and 5 wheeled loaders, some of which is leased to smaller contractors.

COMPETITIVE POSITION OF U.S. SUPPLIERS

U.S. suppliers have a strong position in the Indonesian market for construction equipment and building materials. Contributing factors to this strong position are the generally good reputation of U.S. products for durability and advanced design; financing offered through the U.S. Export-Import Bank and other sources; the aggressive marketing activities of some American suppliers, such as Caterpillar in the heavy equipment field and Carrier in the air-conditioning field; the presence of many U.S.

construction firms in Indonesia using American equipment; and the wide choice of models available from U.S. suppliers.

A substantial amount of U.S. equipment has entered the Indonesian market with the help of financing from the U.S. Export-Import Bank (Eximbank) to the Directorate-General of Highways. One such program in 1976 involved \$72.9 million worth of equipment, which included 100 bulldozers, 100 jackhammers, and over 700 dump trucks. In 1974, the Eximbank granted Indonesia a \$9.8 million loan to support imports of \$24.5 million worth of cutter-suction dredges. In 1975, Eximbank granted another \$11.7 million to aid in the import of 24 dredges valued at \$29.3 million.

Although Eximbank credits have done a great deal toward assisting the sale of U.S. construction equipment in the Indonesian market, much still could be done by U.S. suppliers to improve their market position. Aggressive marketing programs by some U.S. firms, including arrangements for financing and the availability of service and spare parts, have led to successful sales. Technical training is a very important factor in sales of construction equipment; U.S. firms would do well to arrange special training facilities for Indonesian buyers and sales agents. Training in operation and maintenance of earthmoving equipment, air-conditioning engineering, and effective use of tools would give both users and sales representatives more complete familiarity with product quality and capabilities.

Indonesian users of heavy construction machinery indicate that one advantage in purchasing U.S. equipment is that they are able to standardize on a few engine models, since either Caterpillar, International Harvester, or General Motors diesels are used. Service is thus less expensive than if all the different types of European engines had to be maintained.

Several American brands of construction equipment and building materials have established excellent reputations in the Indonesian market. In supply of air-conditioning equipment, Carrier, Chrysler Airtemp, York, and Westinghouse are leaders. In insulating materials, Johns-Mansville and Owens-Corning are best known brands. The most purchased heavy machinery brands include the following: Caterpillar (bulldozers, loaders, tractors, excavators), Terex (bulldozers, loaders, tractors), P&H Harnischfeger (cranes), Barber-Greene (asphalt mixing plants), International Harvester (dump trucks), Morgan (concrete batching plants), Worthington (compressors), Dixie Dredge (dredges), Elicott Machine (dredges), Koehring (excavators and cranes), and Ingersoll-Rand (compactors and compressors).

Although a considerable amount of machinery with an American brand name comes from the United States, a number of U.S. headquartered multinational firms ship equipment from their subsidiaries in Europe, Australia, and Japan. For example, when the British Export Credits Guarantee Department arranged a \$40-million loan made by Lloyds Bank Ltd. to Indonesia, Caterpillar made sales through its British subsidiary in order to supply under the loan.

Delivery times and shipping costs are continuing problems for U.S. suppliers of construction equipment and building products. In order to lessen delivery time, U.S. firms should consider warehousing their products in Jakarta or Singapore.

Promotional programs for construction equipment and building products should include a variety of approaches in view of the wide diversity of items falling within the category. For heavy construction machinery, demonstrations rather than static displays are most effective. Demonstrations should be made at typical construction sites so that potential users and sales agents can actually test equipment performance. Models of houses or other buildings would be effective in giving Indonesian builders and architects examples for applying building products in their own projects.

Technical seminars and catalog shows are appropriate promotional media for both construction machinery and building materials.

Electric Power

Indonesian electric power demands have outstripped the public utility supply. Nearly every significant industrial, commercial, and infrastructure installation in the country has found it necessary to install its own exclusive power source. These captive power plants accounted for 55% of Indonesia's total generating capacity as of 1976.

Indonesia's total generating capacity was estimated at 3,823 MW in 1976. Projections indicate the capacity will increase to 4,400 MW by 1980.

The sales of power generating and distribution equipment in 1975 reached an estimated \$170 million. Annual sales are expected to rise to more than \$230 million by 1980. More than 90% of the equipment is imported.

U.S. suppliers provide about 25% of the imported equipment. To avoid a declining market share, U.S. companies should give particular attention to the areas of credit and finance, service and spare parts systems, and delivery. U.S. suppliers also should introduce Indonesian buyers to a wider range of U.S. products.

SYSTEM STRUCTURE AND SIZE

Although total electric generating capacity in Indonesia has increased rapidly in recent years, it has not kept pace with demand. In 1975 total generating capacity was 3,540 megawatts (MW), up 63% from the 1970 capacity of 2,162 MW (see table 1).

Reliance on captive generating systems in Indonesia is substantial, since Perusahaan Umum Listrik Negara (PLN—the state electricity corporation) has been unable to meet consumer demands, and the majority of industrial, commercial, and government installations generate at least some part of their power requirements with their own plants. In 1976, for example, an estimated 55% of the country's total generating capacity was captive and about 50% of it will remain so through 1980.

Between 1970 and 1975, capital expenditures on electric power grew from \$140 million to \$304 million. By 1980, they are expected to reach \$392 million. In 1970, PLN accounted for about 25% of all capital expenditures on electric power and the captive

sector accounted for 75%. The percentage of total investment by PLN is increasing steadily. Capital expenditures breakdowns for 1980 are estimated at 53% by PLN and 47% by the captive sector (see table 2).

Public Utility Power Generation.—PLN is responsible for public generation and distribution. The corporation has been unable to meet power demands, despite an ambitious program of power plant construction. Between 1970 and 1975, the corporation's power generating capacity more than doubled from 652 MW to 1,400 MW. PLN generating capacity is expected to increase to 1,723 MW by the end of 1976, and to reach 2,200 MW by 1980.

PLN was created in 1961 through the merger of three nationalized utilities. During the pre-1965 Sukarno era, the firm suffered financial and physical

Table 1.—Total Electric Generating Capacity and Capital Expenditures by Sector

	PLN ¹		Captive		Total	
	Mega-watts	US\$ Million	Mega-watts	US\$ Million	Mega-watts	US\$ Million
1970	652	35	1,510	105	2,162	140
1973	901	37	1,900	136	2,801	173
1974	1,044	42	2,000	230	3,044	272
1975	1,400	128	2,140	176	3,540	304
1976	1,723	145	2,100	176	3,823	321
1980	2,200	210	2,200	182	4,400	392

¹ Perusahaan Umum Listrik Negara (the State electricity corporation).

Source: Central Bureau of Statistics, estimates based on trade source interviews.

Table 2.—Total Capital Expenditures by PLN 1970 to 1976, 1980 and 1985
(millions of U.S. dollars)

	1970	1973	1974	1975	1976	1980
Generation	14	15	19	75	85	124
Fossil	5	5	7	29	32	48
Hydro	3	4	5	9	10	15
Gas Turbine	3	3	3	24	28	40
Internal Combustion ..	3	3	4	13	15	21
Transmission	6	6	6	17	19	23
Distribution	13	14	14	31	35	53
Miscellaneous	2	2	3	5	6	10
Total	35	37	42	128	145	220

Sources: Repelita I, Repelita II, PLN, estimates based on trade source interviews.

stagnation. However, since 1970 the French consulting firm SOFRELEC has been conducting a number of basic systems studies on rate structures, financial management, accounting methods, organization, and operational techniques for PLN. As a result of these studies, financed by the International Development Association (IDA), PLN has undergone several changes that have tended to make it a more efficient organization.

One concrete result of the SOFRELEC work was a new PLN legal charter, as embodied in the 1972 Electricity Act. The Act redefined PLN as a public corporation and required PLN to improve its operating efficiency and financial management. The new charter gives PLN the exclusive right and responsibility to generate, transmit, and distribute power throughout Indonesia; to construct and operate power plants and networks; and to supervise non-PLN power activities. The charter also authorizes PLN to fix power rates that can produce revenues sufficient to cover all operating expenses with a surplus for financing further expansion.

The corporation is managed by a President Director who is responsible to the Minister of Public Works and Power. Reporting to the President Director are four members of the Board of Directors, who are responsible respectively for planning, construction, operations, and administration. PLN's regional organization includes 8 construction regions or "Konstruksi," 3 generation regions or "Generasi," 4 distribution regions or "Distribusi," and 11 operation regions or "Exploitasi."

As of 1974, PLN employed approximately 21,000 people, of which about 5,000 were temporary workers. Despite its large employment roster, PLN has a shortage of qualified staff, particularly civil and electromechanical engineers. SOFRELEC has organized a continuing training program to improve the ability of PLN personnel.

PLN has its most developed generation and transmission facilities in Java. Even in Java, however, there is no centralized system, but five separate transmission networks. Outside Java, many small isolated systems provide limited generation and distribution service to the main cities and a few towns and villages. Overall, the system is generally characterized by low-voltage conditions, excessive power losses, poor reliability, and an inability to satisfy the growing demands of people and firms requesting services or more power.

Other Public Power Generation.—In areas not reached by PLN, the utility may license autonomous producers. However, stations of over 50,000 kilovolt amperes (kVA) require approval of the Minister of Public Works and Power, who acts upon PLN's recommendation.

A number of other national government organizations produce power for localities not reached by PLN facilities. These agencies normally employ diesel generating units. In addition, some provincial governments provide electric services on a small scale. In South Sulawesi, for example, the Maskagai Perusahaan Selepat (MPS), an agency owned and operated by the provincial government, provides electricity to about 20 cities and villages in South Sulawesi.

Captive Power Generation

Captive generating is widespread in Indonesia. Even in the major cities served by public power lines, firms use their own generating sets because power outages by PLN are common and very often PLN's supply cannot meet all requirements.

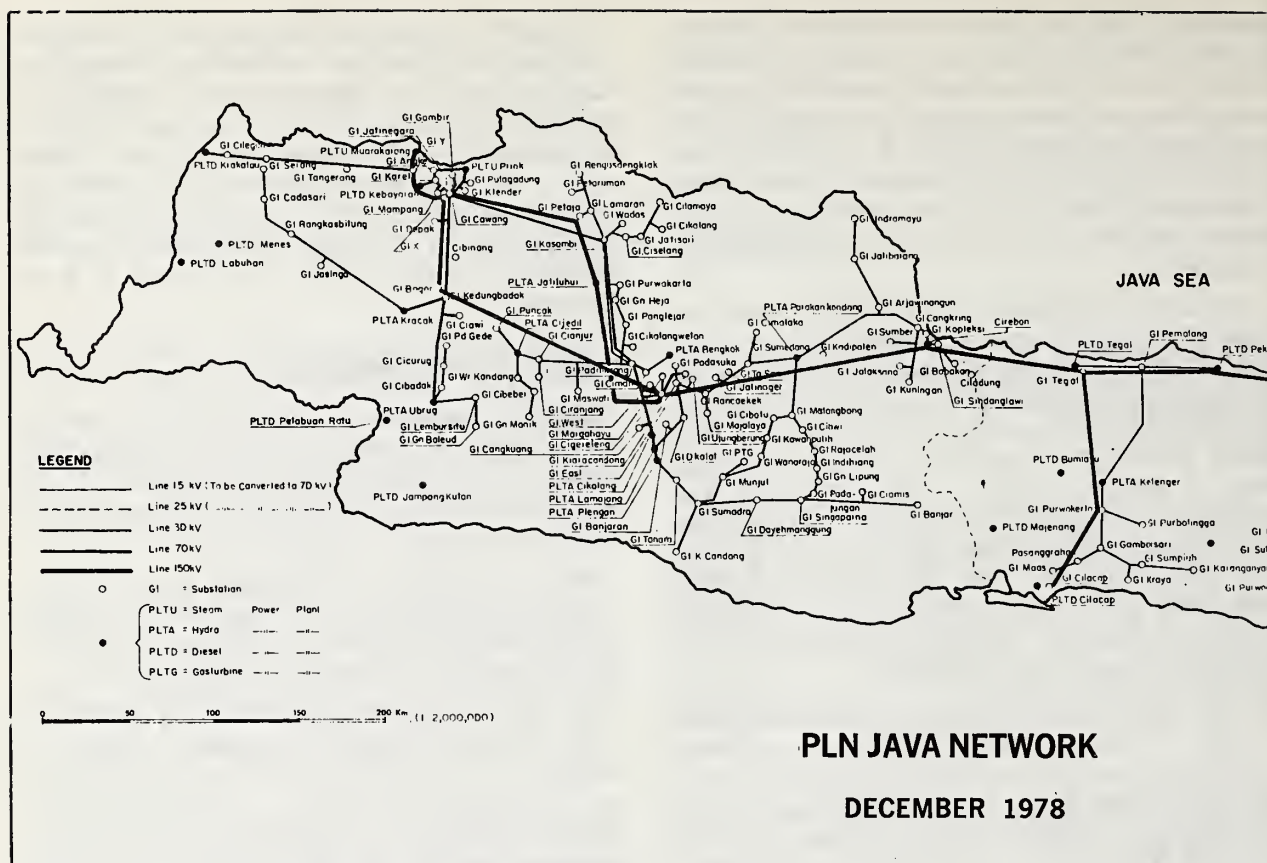
Some commercial establishments, such as motion picture theaters, find it vital to have their own power supply. Many firms have come to consider their private generating sets (normally diesel-powered) as their primary supply sources, with PLN as secondary.

On the outer islands, PLN power is often not available, and individual families and private firms must supply their own power. In the Menado district of North Sulawesi, an estimated 42% of the electric generating facilities are operated by PLN, 13% are operated by other government entities, and 45% are in private hands.

Ports, hospitals, airports, radio and TV stations, and a host of other facilities require their own power. Government departments are also important users of electric generating sets. For example, Perumtel, the public corporation in charge of telecommunications, operates its own power facilities for microwave, radio, and other communications equipment. In the newly installed domestic communications satellite network, each of the ground stations has its own diesel-powered generating facilities.

Even hotels in large cities like Jakarta have standby generating sets. For example, at the small 67-room Menteng Hotel in the heart of Jakarta, the management has installed a 75-kVA generator set.

One foreign firm which started manufacturing electronic components in 1969, decided to supply its own electricity because of the unreliability of the PLN power. For the first phase of the plant, 100 kVA was needed so three Perkins 50-kVA units from England were purchased, with two working units and one generator as a spare. For the second phase of the plant in 1971, three 40-kilowatt (kW) Perkins units were purchased, increasing the capacity to four operating units and two standby units. In 1974, to satisfy still more power needs, three 175-kVA U.S.-made General Motors units were pur-



chased. Finally, an additional three 250-kVA units were purchased from General Motors.

According to a study conducted by Shell officials in South and Central Sumatra, PLN plants in these areas have a total installed capacity of 60.37 MW, while the installed capacity of other organizations, including the State-owned oil company Pertamina, the Pusri fertilizer plant, and the P.N. Batubara State coal company, totaled 100.8 MW. One expert has placed total Pertamina power generation capability at about 156.6 MW, including various refineries, oil drilling operations, and other facilities. This capacity equals 15% of PLN's generating capacity.

In interviews, Caltex officials indicated that the company had about 125 MW of power generation facilities at the firm's Sumatra operations, equivalent to 9% of PLN's total generating capacity in 1975. Atlantic Richfield has a total of about 24.5 MW of power generating capacity on its offshore rigs.

POWER TRENDS, PROGRAMS, AND PROJECTS

During the past 6 years, a major shift has occurred in PLN's power generating sources. In 1970, 48% of PLN's power generating capacity came from hydro sources; in 1975, their share had decreased to 32%. The use of oil-fueled steam has grown rapidly, with

power production from that source rising from 108.8 MW to 250.0 MW between 1970 and 1975. Use of internal combustion diesel engines has also increased. Production from such equipment almost doubled between 1970 and 1975 from 191.7 MW to 360.0 MW (see table 3).

Table 3.—PLN Electric Utility Generating Capacity by Source
(in megawatts)

	1970	1973	1974	1975	1976	1980
Hydro	309.9	403.7	403.7	445.4	532.0	537.0
Coal	—	—	—	—	—	34.3
Oil	108.8	225.0	250.0	250.0	490.9	675.0
Internal						
Combustion	191.7	230.3	264.0	360.0	350.0	446.0
Gas Turbine	42.0	42.0	126.0	345.0	350.0	481.0
Geothermal	—	—	—	—	—	10.0
Total	652.4	901.0	1,043.7	1,400.4	1,722.9	2,183.3

Sources: PLN, estimates based on trade source interviews.

Most dramatic has been the increasing use of gas turbines and diesel generator sets. Between 1972 and 1975, gas turbine usage increased by 721% from 42 MW in 1970 to 345 MW in 1975. Because PLN has been hard pressed in recent years to meet power requirements, it has opted for quick-installation, diesel engine and gas turbine sources. Although cost efficiency of such units is relatively low for generating large blocks of power, the gas turbines and diesel generator sets have been stop-gap measures to ob-

rent plan further emphasizes the need for a regional approach to power supply in order to make the system more reliable. An example of applying this approach is the plan to interconnect the transmission networks on Java (see map on preceding page).

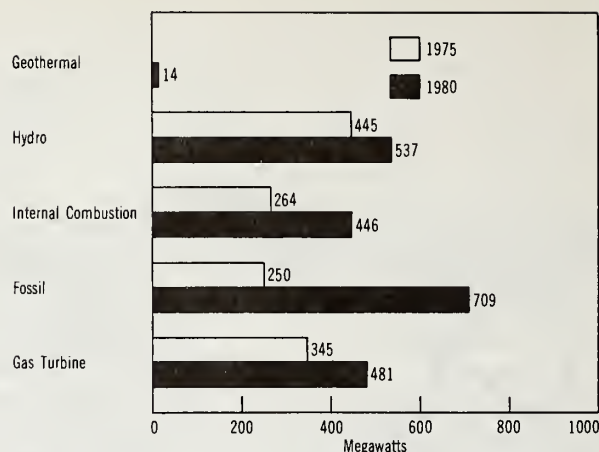
Fund Sources.—With a capital shortage for building new power plants and distribution facilities, the Indonesian Government has sought multilateral and bilateral funding from international financial institutions and individual countries. In addition, supplier credits have been encouraged. Organizations involved in financing Indonesian power projects include: Asian Development Bank (ADB), Banque National de Paris (BNP), Banque de Paris et des Pays Bas (BPPB), Export Credit Guarantee Department (ECGD) of the United Kingdom, Export Development Corporation (EDC) of Canada, Energoinvest (EI) of Yugoslavia, International Bank of Reconstruction and Development (IBRD), International Development Association, Kreditanstalt fur Wiederaufbau (KfW) of West Germany, the Overzeeche Gas and Electriciteits Maatschappij (OGEM) of Holland, International Development Association (CIDA) of Canada, Agency for International Development (USAID) of the United States and the Export-Import Bank of the United States (Eximbank).

Power Development.—Between 1976 and 1985, large electric generating projects planned by PLN for some large mining, liquified natural gas (LNG), and other projects call for additional power generation capacity of about 8,650 MW, involving an investment of over \$3.8 billion (see table 4). Of the 8,650 MW, construction of 4,174 MW, valued at \$1.3 billion, has been definitely funded. Plans include 21 oil-fired steam plants totaling 4,870 MW, at least one coal-fired steam plant of 200 MW, 18 gas turbine projects totaling over 1,000 MW, 19 diesel projects totaling over 360 MW, 20 hydro projects totaling over 2,000 MW, and two geothermal projects with a combined output of 60 MW. Because of Indonesia's financial difficulties, however, the funding for remaining projects and timing and pace at which project money already funded will flow into the system are uncertain.

Plans call for the large oil-fired steam plants to be located in the densely populated island of Java. New plants and additions to existing plants will be built in the Javanese cities of Jakarta, Semarang, Cirebon, Cilacap, and Gresik. Outside the island of Java, oil-fired plants will be built in Sumatra and Sulawesi. To take advantage of the extensive Sumatran coal deposits as a power source, coal-fired plants are scheduled for construction near large coal mines.

To fill power needs speedily, PLN plans construction of gas turbine plants throughout the country. In

Figure 1.—Indonesia: Electric Utility Generating Capacity, 1975 and 1980



Source: PLN, estimates based on trade source interviews.

Java, gas turbine plants will be constructed at Jakarta, Cirebon, Semarang, and Gresik. In Sumatra, gas turbines will be installed at Medan and Palembang. There will also be installations in Sulawesi and Kalimantan.

Plans call for a scattering of diesel plants throughout the country to quickly meet urgent power demands in large cities, as well as to reach the outlying areas with smaller power sources. In addition to numerous small diesel units, larger diesel installations will be made at Medan, Pekanbaru, Padang, Bukit Tinggi, and Bantang Agam on Sumatra; Pontianak, Balikpapan, and Samarinda on Kalimantan; Manado, Bitung, and Tonsea Lama on Sulawesi; on Bali; and on Irian.

Specific Projects

Table 4 lists major power projects planned or underway. Some of these projects are in a state of flux, with funding uncertain. The two Muara Karang plants in Jakarta are under construction by the U.S. firm Black and Veatch. Each phase will have one 100-MW unit for a total of 200 MW capacity. Finance is through the World Bank Group's International Development Association. A third 100-MW unit has been contracted for Muara Karang, with the startup date targeted for 1977 or 1978. The PLN will add two more units of 200 MW each, bringing the total generating capacity of the Muara Karang complex to 700 MW. Bidding on those two units started in 1976.

At Semarang, Central Java, USAID has funded a plant of two 50-MW units. Plans call for two more units at the Semarang complex of 200 MW each. British funding is planned for those two units.

Table 4.—Indonesia: Planned Construction of New Electric Power Plants and Expansion, Modernization and Fuel Changeover of Existing Electric Power Plants, 1975 to 1985

Plant Name	Location of Generating Units	Number	Type	Size each Unit-MW	Total Generating Capacity	Cost US\$ 1,000	Project Status (F=Firm ?=Indefinite)	Proposed Fund Source	Supplier/Engineers	Starting Date	Completion Date
PLTU Medan I & II	Sumatra	2	Fossil (oil)	55	110	28,000	?	EI	EI	1975/76	1982/83
PLTU Salak/Ombilin	Sumatra	3	Fossil (coal/oil)	50	150	32,500	?	ADB		1975/76	1980/81
PLTU Bukit Asam	Sumatra	4	Fossil (coal/oil)	50	200	57,600	?	Shell		1975/76	1980/81
PLTU Muara Karang I & II	Java	2	Fossil (oil)	100	200	79,600	F	IDA	Black & Veatch	1973/74	1977/78
PLTU Muara Karang III	Java	1	Fossil (oil)	100	100	41,000	F	IBRD	Black & Veatch	1977/78	1978/79
PLTU Muara Karang IV & V	Java	2	Fossil (oil)	200	400	135,000	F	IBRD		1978/79	1982/83
PLTU Cilincing	Java	3	Fossil (oil)	200	600	190,000	?	BNP/ECGD/Hall Samuel		1978/79	1982/83
PLTU Cirebon I & II	Java	2	Fossil (oil)	200	400	135,000	?	BNP/ECGD/US-EXIM		1979/80	1983/84
PLTU Cilacap I & II	Java	2	Fossil (oil)	55	110	28,000	?	EI		1979/80	1983/84
PLTU Semarang III & IV	Java	2	Fossil (oil)	200	400	135,000	F	ECGD/U.K.		1978/79	1984/85
PLTU Surabaya III & IV	Java	2	Fossil (oil)	50	100	37,004	F	Japan		1973/74	1977/78
PLTU Gresik I & II	Java	2	Fossil (oil)	100	200	85,000	F	Japan		1977/78	1980/81
PLTU Gresik III & IV	Java	2	Fossil (oil)	125	250	110,000	?	Paris Bas		1980/81	1979/80
PLTU Tanjung Priok	Java	1	Fossil (combined cycle)	100	100	—	?	—	General Electric	1980	1984
PLTG Medan	Sumatra	2	Gas Turbine	15	30	6,200	F	CIDA	Westinghouse/Alsthom Canada	1974/75	1975/76
PLTG Medan	Sumatra	2	Gas Turbine	20	40	3,125	F	France	Westinghouse/Alsthom Canada	1975/76	1977/78
PLTG Palembang	Sumatra	2	Gas Turbine	15	30	6,200	F	EDC/H. Samuel	Westinghouse Canada	1975/76	1977/78
PLTG Jakarta	Java	7	Gas Turbine	20 to 30	140 to 210	25,593	F	1. IDA 2. France 3. USAID		1973/74	1976
PLTG Priok	Java	4	Gas Turbine	50	200	61,064	F	US-EXIM	General Electric	1974/75	1977/78
PLTG Gambir	Java	1	Gas Turbine	15/20	15/20	3,125	F	EDC/H. Samuel		1978/79	1980/81
PLTG Cirebon	Java	2	Gas Turbine	20	40	5,273	F	France		1973/74	1976/77
PLTG Cirebon	Java	2	Gas Turbine	20	40	13,145	F	Paris Bas	Alsthom	1975/76	1977/78
PLTG Medan	Sumatra	1	Gas Turbine	20	20	8,000	F	H. Samuel	John Brown	1974/75	1976/77
PLTG Semarang	Java	1	Gas Turbine	20	20	7,100	?	Paris Bas/H. Samuel	Alsthom	1974/75	1977/78
PLTG Rungkut	Java	1	Gas Turbine	25	25	5,175	—	KFW		1974/75	1976/77
PLTG Gresik	Java	3	Gas Turbine	20	60	28,000	F	Paris Bas	Alsthom	1974/75	1977/78
PLTG Ujung Pandang	Sulawesi	1	Gas Turbine	15	15	3,100	F	CIDA	Westinghouse Canada	1974/75	1977/78
PLTP Kamajang	Java	1	Geothermal	30	30	13,000	?	New Zealand		1975/76	1978/79
PLTP Dieng	Java	1	Geothermal	30	30	13,000	?	US-EXIM/ADB		1980/81	1985/86
PLTD Medan	Sumatra	6	Diesel	4	24	22,800	F	USAID	Enterprise Delaval Harza Vinnel	1973/74	1976/77
PLTD Pekanbaru	Sumatra	4	Diesel	2	8	4,670	F	ADB	Lahmeyer	1977/78	1980/81
PLTD Padang	Sumatra	2	Diesel	2.5	5	—	F	ADB		1971/72	1976/77
PLTD Bukit Tinggi	Sumatra	2	Diesel	1.2	2.4	—	F	ADB		1971/72	1976/77
PLTD Batang Agam	Sumatra	2	Diesel	3.5	7	—	?	ADB	Lahmeyer	1971/72	1976
PLTD Padang II	Sumatra	2	Diesel	5	10	3,000	?	Germany		1976/77	1978/79
PLTD Pontianak I	Kalimantan	3	Diesel	4	12	9,262	?	ADB		1971/72	1976/77

Table 4.—Indonesia: Planned Construction of New Electric Power Plants and Expansion, Modernization and Fuel Changeover of Existing Electric Power Plants, 1975 to 1985—Continued

Plant Name	Location of Generating Units	Number	Type	Size each Unit-MW	Total Generating Capacity	Cost US\$ 1,000	Project Status (F=Firm ?=Indefinite)	Proposed Fund Source	Supplier/Engineers	Starting Date	Completion Date
PLTD Balikpapan/Samarinda ..	Kalimantan	8	Diesel	4.04	32.32	29,390	?	ABN/OGEM		1974/75	1978/79
PLTD Balikpapan/Samarinda ..	Kalimantan	4	Diesel	4	16	—	?	Netherlands		1977/78	1980/81
PLTD Menado	Sulawesi	2	Diesel	2.5	5.0	—	?	ADB		1974/75	1977/78
PLTD Bitung	Sulawesi	1	Diesel	4	4	—	?	ADB		1974/75	1978/79
PLTD Tonsea Lama I	Sulawesi	1	Diesel	4.5	4.5	—	?	ADB			
PLTD Bali II	Bali	1	Diesel	5	5	—	F	UK		1977/78	1980/81
PLTD Bali III	Bali	1	Diesel	5	5	1,750	F	UK		1982/83	1984/85
PLTD Bali IV	Bali	1	Diesel	5	5	2,000	F	UK		1983/84	1985/86
PLTD Blak	Irian	2	Diesel	1	2	—	?	ADB		1973/74	1976/77
PLTD Jayapura	Irian	2	Diesel	2	4	—	?	ADB		1977/78	1980/81
PLTA Batang Agam III	Sumatra	1	Hydro	3.5	3.5	1,500	?	Japan/ADB		1975/76	1980/81
PLTA Maninjau	Sumatra	3	Hydro	15	68	62,700	F	ADB		1980/81	1982/83
PLTA Tes	Bengkulu	2	Hydro	2	4	1,400	?	CIDA		1977/78	1982/83
PLTA Juanda VI	Java	1	Hydro	25	25	3,225	F	France		1976/77	1982/83
PLTA Saguling	Java	1	Hydro	600	600	300,000	F	USSR, France			
PLTA Cimanuk	Java	1	Hydro	400	400	200,000	F	IBRD		1977/78	1983/84
PLTA Garung	Java	2	Hydro	12	24	19,800	F	ADB		1977/78	1979/80
PLTA Sempor	Java	2	Hydro	1.5	3	2,000	?	EI		1977/78	1979/80
PLTA Karangates III	Java	1	Hydro	35	35	10,845	F	Japan		1974/75	1976
PLTA Wlingi I	Java	1	Hydro	27	27	14,500	F	Japan		1974/75	1978/79
PLTA Wlingi II	Java	1	Hydro	27	27	8,500	F	Japan		1976/77	1979/80
PLTA Riam Kanan III	Kalimantan	1	Hydro	10	10	3,850	?	BNP/Java		1977/78	1980/81
PLTA Ayung	Bali	1	Hydro	10	10	4,000	?	UK/Austria		1977/78	1982/83
PLTA Sawangan	Sulawesi	1	Hydro	10	10	10,000	?	ADB/Canada		1977/78	1982/83
PLTA Sentani	Irian	2	Hydro	10	20	11,000	?	ADB/Canada		1975/76	1982/83
PLTA Mrica	Java	3	Hydro	60	180	100,000	?	USSR		1980/81	1987/88
PLTA Maung	Java	2	Hydro	85	170	120,000	?	USSR		1977/78	1982/83
PLTA Karang-Sembung	Java	1	Hydro	100	100	70,000	?	ADB		1974/75	1978/79
PLTM Tersebar	All Country	Multi	Hydro	Various	8.25	8,630	?	UK/France/Austria/BNP/ECGD	Tata Consultants Snowy Mountain		
PLTD Tersebar	All Country	Multi	Diesel	Various	150	150	?	Netherlands/Java/ABN/OGEM		1973/74	1978/79
Major Captive Power Projects											
Badak LNG Plant	Kalimantan	3	Gas Turbine	12.5	37.5	7,000	F	Pertamina	Bechtel	1975	1976
Krakatau	Java	5	Fossil (oil)	80	40	—	F	Pertamina	Siemens/Kraftwerk-Union	—	—
Lhok Seumawe LNG Plant	Sumatra	8	Gas Turbine	21	168	—	F	Pertamina	Hitachi	—	—
INCO Sorako	Sulawesi	2	Fossil (oil)	25	50	—	F	International Nickel	Bechtel-General Electric	1976	1978

Table 4.—Indonesia: Planned Construction of New Electric Power Plants and Expansion, Modernization and Fuel Changeover of Existing Electric Power Plants, 1975 to 1985—Continued

Plant Name	Location of Generating Units	Number	Type	Size each Unit— MW	Total Gener- ating Capacity	Cost US\$ 1,000	Project Status (F=Firm ? = Indef- inite)	Proposed Fund Source	Supplier/ Engineers	Starting Date	Comple- tion Date
<i>Major Captive Power Plants—</i>											
Continued											
INCO Sorako	Sulawesi	2	Hydro	60	120	—	F	International Nickel Consortium	Bechtel	1975	1978
Asahan	Sumatra		Hydro	—	425	—	F			1977	1985
Bukit Asam	Sumatra		Fossil (coal)	—	200	—	?	Shell			

Notes: 1. PLTU (Pembangkit Listrik Tenaga Uap—Steam Generating Plant), PLTG (Pembangkit Listrik Tenaga Gas—Gas Turbine Generator Plant), PLTP (Pembangkit Listrik Tenaga Panas Bumi—Geothermal Generator Plant) PLTD (Pembangkit Listrik Tenaga Diesel—Diesel Generating Plant). PLTA (Pembangkit Listrik Tenaga Air—Hydroelectric Generator Plant).

2. ADB=Asian Development Bank, BNP=Banque Nationale de Paris, EPPB=Banque de Paris et des Pays Bas, ECGD=Export Credit Guarantee Department—United Kingdom, EDC=Export Development Corporation—Canada, EI=Energoinvest—Yugoslavia, IBRD=International Bank for Reconstruction and Development, IDA=International Development Association, KfW=Kreditanstalt für Wiederaufbau, OGEM=Overzeesche Gas & Electriciteits Maatschappij, USAID=U.S. Agency for International Development US-EXIM=U.S. Export-Import Bank, CIDA=Canadian International Development Association, UK=United Kingdom, USSR=Union of Soviet Socialist Republics.

Sources: PLN, Pertamina, estimates based on trade source interviews.

Other fossil-fuel steam plants totaling 680 MW are scheduled for construction startups in Java after 1978; for example, the Krakatau Steel complex's five 80-MW units will be supplied by Siemens of Germany. Outside of Java, fossil-fuel plants, totaling 475 MW, are planned for Sumatra and Sulawesi. At the Ombilin coal mine, in Sumatra, plans call for construction of coal-burning steam units. Also at the Bukit Asam coal mine plans are for generating units. In Sulawesi, in addition to two 25-MW fossil-fuel units planned for Ujung Pandang by PLN, the International Nickel Company refinery plant for Sorako in Sulawesi calls for an initial power plant of two 25-MW units.

Gas turbine installations are planned or are being constructed in densely populated regions of North Sumatra, South Sumatra, East Java, West Java, and Sulawesi. For areas requiring less power output, diesel generating sets are also being installed. PLN plans to install diesel units, totaling 150 MW, throughout the country by 1979.

Hydroelectric facilities totaling over 600 MW are being considered for various parts of the country. For example, in Java, PLN has contracted with French suppliers to add another 25-MW unit to the existing Juanda hydroelectric plant. In addition to that installation, planning is underway for a 600-MW complex at Sauling, a 400-MW complex at Cimanuk, two 12-MW units at Garung, and two 1.5-MW plants at Sempor.

In late 1975, the Asian Development Bank (ADB) approved a loan of about \$19 million for construction of the Garung project in Central Java with two 12-MW generating sets. The project also involves the construction of about 70 kilometers (km) of 150-kV transmission line connecting the towns of Garung and Magelang. Total cost of the project is forecast to reach \$31.9 million, including the \$19.8 million foreign currency portion. Snowy Mountain, the Australian firm of consulting engineers, has started planning for three 60-MW hydro units at Mrica in Java.

In early 1976, the French offered a loan for three 15-MW hydroelectric units at Lake Maninjau, West Sumatra. A Japanese consortium, building the large Asahan Aluminum Project, plans to construct a hydroelectric facility capable of generating 425 MW of electricity. In Benkulu, two 2-MW hydro plants are planned by PLN. In Kalimantan, one 10-MW hydro unit is planned, and other 10-MW units are planned for Bali, Sulawesi, and Irian. On Sulawesi, International Nickel plans two 60-MW hydroelectric units to augment its two 25-MW oil-fueled steam plants.

In addition to the above-mentioned projects, PLN plans construction of numerous microhydro projects, totaling over 8 MW, in various parts of the country.

The West Java transmission project is under construction with credits supplied from USAID, France, and other sources. This project will involve 200 km of 150-kV line and related equipment. In Central Java, USAID and German financing are enabling the construction of 300 km of 150-kV line. The Japanese are installing 250 km of 150-kV and 70-kV line in East Java. Longer range plans call for a major trunk line to interconnect all of Java. The feasibility study is now underway, and industry observers expect that the recommendations will include a 400-kV trunk line, in addition to numerous feeder lines.

POWER GROWTH PROSPECTS

Government planners see development of electric power as the pacesetter for development in industry, agriculture, mining, education, health, social welfare, and other sectors. Indonesian planners have stated in the second 5-year plan that in implementing its task, PLN must ensure, on the basis of rational and sound principles of business economics, a balance between social factors and exploitation. They projected an annual increase in power demand at 18% per year during 1975-79 and thus planned raises in the power capacity of PLN by 14% to 18% per year reaching 6,782 MW by the end of the Plan in 1978/79. In addition, 1,920 km of 150-kV lines, 1,600 km of 70-kV lines, 180 km of 30-kV lines, 8,500 km of primary tension distribution lines, and 11,020 km of secondary tension distribution lines, plus 5,640 corresponding distribution stations, would be constructed.

The current plan targets probably will not be achieved because the government budget has been tightened as a result of the Pertamina problems. More realistic projections indicate that power output by 1980 will be close to 4,383 MW. However, funds from the World Bank and various countries and suppliers continue to be advanced, so work for ongoing projects has not slackened substantially. It is not clear whether the flow of funds will continue for new projects. The problem, according to one expert, is not a shortage of funds or donors, but rather a recognition that the Indonesian Government must hold back on accepting such funds if it intends to maintain financial solvency.

Experts have estimated that PLN would have to increase power sales by about 30% each year in the West Java area alone to catch up with current demand, which is presently covered through captive generation or is suppressed. The current plan calls for an increase in PLN power output of between 14% and 18% per year; this power increase indicates that captive power plants will continue to be an important element in the Indonesian power supply picture for many years to come.

MARKET SIZE

The total market for electric power generating and transmission equipment in Indonesia was an estimated \$169 million in 1975 and is expected to reach \$188 million in 1976 (see table 5). Total annual equipment sales are expected to reach \$232 million by 1980. Considering sales of electric power generating equipment only, the market size in 1975 was \$124 million, up 60% from the 1973 total of \$78 million. The market for electric power generation equipment is forecast at \$144 million by 1980. Sales of electric transmission and distribution equipment more than doubled from \$20 million in 1973 to \$45 million in 1975. Sales of such equipment are predicted to reach \$88 million by 1980.

Sales projections indicate that PLN will account for a growing portion of equipment expenditures. Nevertheless, even by 1980, almost half of market sales will be to the captive sector. Of total 1973 expenditures on electric power generation, transmission, and distribution equipment, 21% was spent by PLN while the remaining 79% was spent by the captive power generation sector. Of total market expenditures in 1976, 45% are attributable to PLN, and 55% to the captive sector. By 1980, PLN is expected to account for 54% of total expenditures and the captive market, 46%.

Table 5.—Indonesia: Size of the Market for Electric Power Generating and Transmission Equipment
(millions of U.S. dollars)

	1973	1974	1975	1976	1980
Electric Power Generation Equipment					
Domestic Production	—	0.2	0.6	0.8	1.5
Imports					
United States	17.5	33.4	34.4	36.5	35.7
Japan	19.1	27.3	28.3	—	—
United Kingdom	8.1	7.5	7.8	—	—
West Germany	14.8	29.1	30.1	—	—
France	0.5	6.9	7.1	—	—
Netherlands	2.8	0.9	1.0	—	—
Other	14.8	14.6	15.0	—	—
Total	77.6	119.7	123.7	131.2	143.0
Market Size	77.6	119.9	124.3	132.0	144.5
Electric Power Transmission and Distribution Equipment					
Domestic Production	0.8	2.6	6.0	10.1	20.2
Imports	—	—	—	—	—
United States	3.1	7.1	8.1	10.4	13.6
Japan	4.7	8.8	10.1	—	—
United Kingdom	0.1	0.1	0.1	—	—
West Germany	3.8	5.4	6.2	—	—
France	0.6	1.5	1.7	—	—
Netherlands	0.6	2.2	2.5	—	—
Other	6.6	9.0	10.4	—	—
Total	19.5	34.1	39.1	46.1	68.0
Market Size	20.3	36.7	45.1	56.2	88.2
Total Market Size	97.9	156.6	169.4	188.2	232.7

Source: Official Indonesian and supplier statistics, and estimates based on trade source interviews.

Imports

Imports supply the major portion of electric generation distribution and transmission equipment. Although supply from local manufacturers will take an increasing share of the market, the bulk of Indonesia's needs through 1980 will continue to be obtained from abroad. In 1975, imports accounted for 96% of the total supply, with domestic suppliers accounting for 4%. For 1980, the prediction is that 90% of all equipment will be supplied from imports and about 10% from domestic manufacturers.

Domestic suppliers are involved mainly in supply of distribution and transmission equipment such as cables, transformers, insulators, and line fixtures. Although there is domestic assembly of diesel engines and plans for production of small electric generators, the bulk of power generation equipment will continue to be supplied by imports in the short- and medium-term future.

Generation Equipment.—The United States, Japan, and West Germany are leading sources of electric power generation equipment. All three countries have leading manufacturers of diesel generating sets for the captive power generation market, and all three countries have supplied or will supply major fossil-fuel steam generating equipment to PLN. Since U.S. technology in gas turbines leads the world, direct U.S. exports, foreign subsidiaries of U.S. firms, and U.S. licensees will account for the major sales of this equipment.

In 1975, market shares in electric power generation equipment were 28% for U.S. suppliers, 23% for Japanese suppliers, and 24% for West German suppliers. However, it is expected that Japanese suppliers' 1980 share will have increased at the expense of U.S. and West German suppliers. This increase in share will largely result from aggressive financing by Japanese suppliers, greater involvement by Japanese suppliers in very large hydroelectric projects, and growing penetration by Japanese suppliers of diesel generating sets.

France will increase its market share of generation equipment sales in future years, not only because of the great influence French consulting groups, such as SOFRELEC, have had on PLN equipment-purchase thinking, but also because of the extensive financing French suppliers are offering for gas turbine plants. Between 1975 and 1980, France's share of the generation market should increase from 6% to 11%.

Distribution and Transmission Equipment.—In 1975, the market shares of major suppliers of power generation equipment were Japanese 25%, United States 21%, and West Germans 16%. The Japanese have been successful in winning international tenders as a result of their low prices and liberal financing. Sales of U.S. and West German equipment have been facilitated through supplier credits and government

bilateral loans. U.S. and French generating equipment suppliers sometimes offer their equipment in a package with distribution and transmission equipment included. As a result, many U.S. and French transmission and distribution equipment suppliers have been able to "piggyback" with generator suppliers in the sales of their equipment. West German manufacturers have an excellent reputation in the Indonesian market.

Domestic Manufacturing

Indonesian manufacture of electric power equipment is growing in volume and sophistication, with major impetus coming from foreign suppliers who have encouraged their local agents to start assembly and fabrication operations for items such as control panels. P.T. Unindo, a joint venture between PLN and the French firm Campagnie Generale d'electricite (C.G.E.), produces three-phase power transformers with kVA ratings from 25 kVA to 630 kVA. Single-phase transformers produced range from 8 kVA to 64 kVA. The firm also produces metalclad switching cubicles for transformer substations. Production capacity is 1,000 units per year, but actual production averages about 800 transformers per year.

The firm of P.T. Bina Electro manufactures motor relays and control panels on a small scale. The firm has a licensing agreement with AEG of Germany. One of the largest manufacturers of electric insulators, overhead line hardware, and cable accessories is P.T. Twink Indonesia in Jakarta. The firm makes shackle, pin, egg, post, bushing insulators and terminal blocks, in addition to low voltage disconnecting switches to 1,000 amperes high voltage, disconnect switches of 6 to 20 KW, and various types of fuses. P.T. Icesa, whose factory is in the Ancol area of Jakarta, produces panel boards from imported components. Production is now about 150 units per year. P.T. Mega assembles switch panels, low voltage transformers of up to 500 kVA, rectifiers and carbon brushes for generators, and electric motors from components imported from the Swiss firm of Brown Boveri.

Diesel engines are assembled in Indonesia by Yanmar and Kubota of Japan. Each firm produces about 6,000 units of 3 to 15 hp, which are used for pumps and prime mover purposes in addition to being attached to electric generators. In Surabaya, a joint venture between the State-owned P.T. Boma-Bisma-Indra and the German firm, Deutz, plans to assemble small diesel engines and electric generators.

P.T. Eltab, a joint venture with the Eltab Company of Ceylon (a licensee of the U.K. General Electric Company), plans to produce electromotors and generators in its Jakarta factory.

The Indonesian Government is seeking a joint venture partner for an electric motor and generator factory which it owns. The factory was built with Bulgarian Government aid during the Sukarno period to produce generators of up to 10 hp under a license from the Bulgarian agency, Elprom.

Production of electric and telecommunications cable has grown rapidly in recent years. There are about a half-dozen cable factories producing approximately \$24 million of both telecommunications and electrical cable. Of that total, approximately \$10 million is for electrical use.

Exports of electric generation, transmission, and distribution equipment from Indonesia are negligible and will continue to remain so during the coming years.

MARKET OPPORTUNITIES

Fossil-fuel Steam Generating Plants.—PLN will be constructing a number of oil-fuel steam generating plants which could provide opportunities for U.S. suppliers. Some of these plants are being funded by the World Bank, the Asian Development Bank, and other multilateral agencies. Others are being funded from U.S. sources and would provide direct opportunities for U.S. sales. Still others are being funded from non-American bilateral loan agreements between Indonesia and other supplier countries. When this is the case, the primary opportunity would be for suppliers in the country providing the funds, but there may be opportunities for U.S. suppliers offering auxiliary equipment.

PLN and private company plans call for installation of 25 power plants on Java during the next 10 years. These include four plants in the 50- to 55-MW range, five plants in the 80-MW range, seven plants of 100 MW, and nine plants of 200 MW. On the Island of Sumatra, plans call for construction of seven 25-MW plants, two 55-MW plants, and one 200-MW plant. On Sulawesi, four plants are on the drawing board.

Diesel Generator Sets.—The captive power sector provides the greatest opportunities for sales of diesel generator sets. Every category of industry and commercial venture in addition to a substantial number of large residences require diesel generator sets. Large industrial plants have found that investing in their own generating plant can prove less expensive than PLN power, considering the high rates and unreliability. Official Indonesian statistics show that imports of electric generating sets in 1975 were as follows:

	Number of Units	Value in Thousands of US \$
Electric generating sets, less than 5 kVA, CKD	27	11
Electric generating sets, less than 5 kVA, Built-Up	594	1,602
Electric generating sets, 5 kVA to 150 kVA, CKD	17	446
Electric generating sets, 5 kVA to 150 kVA, Built-Up	1,375	11,098
Electric generating sets, Over 150 kVA	3,841	82,583

As the above figures indicate, officially recorded imports of electric generating sets totaled over \$95 million in 1975, with the largest portion consisting of units in the 150-kVA and over category.

Gas Turbines.—Opportunities for supply of gas turbines to both the public and private sectors are excellent. PLN has plans for construction of a number of gas turbine plants. The large oil production and exploration companies, operating under contract to Pertamina, purchase gas turbines to meet their own power needs and to utilize the natural flare gas available from the oil fields.

One example of extensive gas turbine usage may be seen in the case of Atlantic Richfield's offshore oil drilling operations. The firm has a total of 53 offshore oil rigs in Indonesia with both diesel and gas turbine generating facilities. Included in their equipment inventory are five 1,300-kW Viking gas turbines with Westinghouse switchgear, Niagara transformers, Esco transformers, and Electrical Machinery Company generators. In addition, there are four 2,300-kW International Harvester Solar Centaur gas turbines. Plans call for purchase of four additional gas turbines in 1976.

Other PLN and private plans for gas turbine generating plant installations will require imports of about 55 gas turbines during the next 10 years. On Java, 1 plant will be in the 15- to 20-MW range, 36 plants will be in the 20- to 30-MW range, and 4 plants will be in the 59-MW category. On Sumatra, 4 plants will be of 15 MW and 11 plants will be in the 20-MW range. On Sulawesi, three plants will be of 12 MW, while one plant will be of 15 MW.

Hydroelectric Power Plants—Sales of hydroelectric power plants and related equipment have excellent potential. A wide range of plants are required—from low-power miniplants to serve small, isolated communities to major developments of 20 MW and over.

PLN and other plans call for a total of 26 major hydroelectric installations on Java, 5 on Sumatra, and over 6 in other parts of the country, not including many minihydroelectric projects. On Java, the

plans call for two units below 10 MW, two units of 10 to 20 MW, four units of 20 to 40 MW, six units of 60 to 100 MW, and two power complexes of 400 to 600 MW. On Sumatra, plans call for four units of 15 MW or below, in addition to the huge 400-MW to 600-MW Asahan project.

Transmission and Distribution Equipment.—PLN's extensive plans for additional power generation will require transmission and distribution equipment to facilitate the sale of power to consumers throughout the country. Efficiency studies call for more effective interconnection between power plants and regions, as well as wider distribution lines to the small communities. A wide range of transformers, switchgear, and other such equipment will be required. Although local manufacturers are able to supply low voltage and small capacity equipment, high voltage and high capacity equipment must be imported. There are good opportunities for sales of electric meters. One expert said that there could easily be a market for 100,000 units per year for use by PLN on domestic customer installations.

Technology and Service Opportunities.—Each major PLN generation and transmission project has a foreign consultant assigned to it for purposes of planning and for supervising construction. Foreign consultants are active in Indonesia because of lending activities by the multilateral institutions, such as the World Bank and the Asian Development Bank; all of these institutions require consultants first to determine the feasibility of various projects and then to oversee proper execution of loans given.

Combined Cycle Plants.—Plans are underway to use combined cycle power systems (combined gas turbine and steam turbine systems) in view of the large number of gas turbine plants now in operation, in construction, or in planning stages. The first such installation will probably be at the Pulo Gadung Industrial Estate near Jakarta.

EHV and UHV Transmission.—The highest transmission voltage now used is 150 kV. The Government plans to develop a backbone of 400 kV for the Java system.

Central Control.—Experts say that PLN needs a central dispatch office and a system of modern communications and relays on the existing transmission facilities; such improvements would substantially upgrade service.

Microhydro Power Plants.—A number of microhydro power plants below 5 MW are planned in isolated Indonesian communities, separated from the main power lines.

Lignite Burning Equipment.—The Bukit Asam mine in South Sumatra produces brown lignitic to sub-bituminous coal. The planned power plant for that site requires lignite-burning equipment.

Geothermal and Nuclear Power Technology.—To conserve petroleum as a source of foreign exchange earnings, Indonesia is committed to long-range development of alternative power sources. With the number of geothermal plants planned, there is a definite need for geothermal power technology. Additionally, Indonesia will need nuclear power technology, since it is committed to the development of nuclear power.

IMPORT PROCUREMENT

Buyers Universe

The buyers universe for electric power generating, transmitting, and distributing equipment includes five major market segments: PLN; State-owned companies and departments with captive generating requirements or facilities; domestic private commercial, agricultural, and industrial firms; foreign ventures in manufacturing, service, and extractive industries; and private homes.

PLN.—PLN purchasing is normally undertaken by open tender with procedures established for bidding. In view of the extensive foreign financing of PLN projects, the bidding requirements differ, depending on the specifications laid down by the financing source. Generally speaking, procedures established for the World Bank, the Asian Development Bank, and the U.S. Export-Import Bank apply.

Since some PLN purchasing is not determined by bidding, U.S. suppliers should maintain close liaison with all PLN departments and operating echelons to ensure proper exposure and development of opportunities as they arise. All actual procurement, however, is handled centrally in the PLN Purchasing Office in Jakarta at the following address: Perusahaan Umum Listrik Negara (J1. Trunojoyo Blok M 1/135, Kebayoran Baru, Jakarta Selatan, Indonesia).

State-owned Companies and Departments.—In addition to State-owned firms in such fields as mining, manufacturing, forestry, and plantations, a number of departments within the Government have their own power and distribution facilities. Some of these organizations undertake open bidding when making large purchases of equipment. Others follow private business practice and negotiate directly with potential suppliers. Each normally has a purchasing department to undertake actual purchasing. However, decisions are most often made in the engineering departments of these organizations. It is, therefore, important to maintain close liaison with engineers and the heads of engineering departments.

Domestic Firms.—Thousands of private commercial, agricultural, and industrial firms generate their

own power. The size of these firms varies greatly—from a small restaurant with a 10-hp diesel generator set to large textile firms with several large diesel generating sets. For small firms, purchasing decisions are made by the proprietor; in the case of large firms, purchasing decisions may be based on a combination of factors, including inputs from the principal equipment supplier, the contractor constructing the facility, and the engineering department of the firm.

Foreign Ventures.—Foreign contractors and developers in the mining and petroleum fields and foreign manufacturers of pharmaceuticals, electronics, and other products are substantial users of electric power equipment. While other private firms normally have only diesel generator sets, many of the mining and petroleum firms have very large facilities. In some cases, even steam generating and hydroelectric plants are planned; for example, the International Nickel project in Sulawesi will include an oil-fired steam plant and a hydroelectric plant. Offshore oil drilling firms have, in addition to diesel generator sets, gas turbines utilizing natural gas from their fields.

Since most foreign firms in the petroleum and mining field are American-owned, a wide selection of U.S. equipment is used. Decisions on equipment purchases are often made in the U.S. home offices or in their Singapore regional offices. Because equipment requirements and procurement approaches vary, it is necessary to take a multifaceted approach when selling to foreign ventures in Indonesia, with sales efforts directed to the home office, the regional office, and the engineers on the job.

Private Homes.—Sales of both gasoline and diesel generator sets for private homes are made to homeowners or building contractors. Normally, agents establish showrooms where these customers may come and view the equipment and negotiate prices and terms. Building contractors sometimes make the decisions regarding what type of generator sets to use although building owners, in most cases, have prime responsibility for equipment selection.

Role of Consultants.—PLN has no in-house capability at all for technical consulting work, and they use foreign consultants extensively.

Foreign consulting and contracting firms used by PLN include: Charles T. Main International (United States), Tata Consulting Engineers (India), Verbund-Plan Consulting Engineers (Austria), Nippon Koei (Japan), ASMIC (France), Electric Power Development Company (Japan), Black and Veatch (United States), AMELCO (United States), M. N. Dastur and Co. (India), Irby Construction Company (United States), Vinnell Corporation (United States), Preece, Cardew and Rider (United Kingdom), Balfour Beatty

(United Kingdom), WESJEC (Japan), Leo A. Daly Pacific (United States), Dravo Corporation (United States), Gaffney, Cline and Associates (United States) M.W.K. International (United States), Pacific Procon (United States), Whittaker Corporation (United States), William Brothers Engineering (United States), Louis Berger (United States), Brown and Root (United States), Engineering Consultants (United States), Fluor Corporation (United States), M.W. Kellogg Company (United States), and Sverdrup and Parcel (United States).

Suppliers Universe

The 20 most significant worldwide suppliers of major fossil-fuel fired steam generating plants, hydroelectric plants, and gas turbine plants are represented in Indonesia either through a formal agency arrangement, a resident representative, or informal contacts by marketing personnel with key business and government leaders. Since large plants funded under multilateral programs receive worldwide publicity, these major firms consistently enter the bidding. Suppliers, such as General Electric and Westinghouse (United States), Alsthom (France), Toshiba, Hitachi, Mitsubishi, and Sumitomo (Japan), Kraftwerk-Union, Siemens, and AEG (West Germany), Energoinvest (Yugoslavia), Elin Union (Austria), Nuovo Pignone (Italy), Brown and Boveri (Switzerland), and John Brown Engineering (United Kingdom), are active in the Indonesian market for those large power plant projects.

About 30 firms supply diesel generator sets in the Indonesian market; approximately 10 firms hold the largest market shares. Market leaders include Deutz, MAN, and MWM (West Germany); Perkins (United Kingdom); Caterpillar, General Motors, and Cummins (United States); and Honda, Kuobota, and Yanmar (Japan). Kuobota and Yanmar of Japan are assembling diesel engines in Indonesia, while Deutz of Germany is planning a plant for assembling diesel generators.

The success of third-country suppliers in PLN projects can often be traced to credit terms offered. Another marketing practice or technique which enhances third-country supplier positions is consortium bidding. Japanese suppliers are particularly adept in putting together large consortiums into package deals that include suppliers for all types of equipment, services, and financing. By presenting financed packages, they are often in a stronger bargaining position with Indonesian government officials.

For sales to the captive power market, equipment availability, an aggressive selling program, good agent selection, countrywide sales and service, and easy credit terms are key factors in accounting for the success of suppliers such as Caterpillar.

In the case of distribution and transmission equipment, over 50 firms are active in the Indonesian market with a wide range of transformers, cable, fixtures, etc. Some equipment, however, is sold as part of a package with the power generating equipment to which it would be attached or related. In large PLN power projects, Alsthom, for example, would supply not only the generating equipment, but also related distribution and transmission equipment.

Marketing Factors

As previously indicated, electric power equipment in Indonesia is sold both through local agents or directly to end users. In many cases, particularly in the instances of large foreign investment projects, the equipment is purchased in the home office and shipped directly to the project in Indonesia.

Since Indonesia is a widely dispersed country with rather poor inter-island shipping facilities, it is sometimes more convenient and less costly to ship equipment from Singapore to areas such as Kalimantan or Sumatra. Distributors of foreign electric power equipment suppliers normally have their head offices in Jakarta with branch offices in the major cities of Java, Sumatra, Kalimantan, and Sulawesi. The smaller firms have agents in the cities outside Jakarta, or a combination of their own branch offices and local agents.

Importing electric generation and transmission equipment into Indonesia involves many time-consuming complicated procedures and, according to a number of respondents, requires extra payments to officials at the ports, even in cases of government-funded projects. Import duties for electric power systems equipment range from 10% to 40% of the c.i.f. value, while the sales tax ranges between 5% and 10%.

One importer of diesel generator sets said:

On the import of a \$10,000 diesel generator set, we had to pay the following: \$3,000 regular import duty, \$3,000 surtax since it came from Singapore, \$3,400 storage in Singapore, \$1,500 shipping, and \$400 for consular invoices and payments to officials.

According to one report in about 50% of the cases investigated, customs clearance at Tanjung Priok port in Jakarta averaged about 70 days and in two cases, about 250 days.

Many major end users in Indonesia normally stock their facilities with spare parts and have their own repair teams for their generating facilities. For example, on the offshore drilling rigs, spare parts and trained mechanics are always available.

Indonesia's electric power is often supplied at 127/220 volts or 110/190 volts, 50 cycles, but PLN's current policy is to make new services at 220/380 volts, 50 cycles and convert existing serv-

ices to that new standard. In some large American oil installations, such as the Caltex production areas in Sumatra, the electricity standard is the same as in the United States, 115/230 volts or 220/440 volts, 60 cycles. Nevertheless, most equipment supplied in future years to Indonesia will probably have to conform to the 50-cycle standard. Most new primary distribution is 20 kV.

PLN recognizes the need for standards and has investigated the possibility of using Japanese technical aid for developing them. PLN also has investigated the possibility of establishing a laboratory for acceptance tests for thermal power plant equipment and testing and calibration of meters.

Weatherizing electric power equipment is important because of the Indonesia's tropical weather. Equipment should be able to withstand rough treatment and conditions conducive to rusting. Packing for shipment should be designed to protect the equipment against such conditions.

Indonesian public and private end users rely heavily on supplier financing for their imports of electric generating and transmission equipment. At the government level, PLN relies on export credits or project aid. Local dealers and agents normally extend credit to their large customers with terms ranging from a few months to a few years. In the case of PLN, procedures for establishing letters of credit and issuing import licenses often require up to 6 months.

An aggressive local agent with branches in all parts of the country is essential for successful sales to the captive market. The large scope for sales to every conceivable end-user group, such as hospitals, hotels, and theaters, makes it imperative that the local agent reach a wide variety of possible end users throughout the country.

Newspaper advertising and motion picture slides are used by some electric equipment suppliers to promote their products. These forms of advertising are useful in reaching a wide cross-section of possible equipment users.

COMPETITIVE POSITION OF U.S. SUPPLIERS AND PRODUCTS

U.S. Market Share

About one-quarter of the electric power generation, transmission, and distribution equipment sold in Indonesia comes from the United States. These sales have been helped by U.S. Government financing of electric power projects through the United States Export-Import Bank and the U.S. Agency for International Development, in addition to the activities of American oil exploration and production com-

panies under contract with Pertamina. These oil firms tend to purchase their generating equipment from the United States.

In future years, the U.S. share of the market will decrease unless U.S. suppliers are able to compete with the more attractive financing being offered by Japanese and European suppliers to both private interests and government. In addition, the Soviet Union and East European countries are becoming more active in the market and offer liberal credit terms. There is also a tendency for PLN to prefer European-type transmission and distribution equipment because of voltage and frequency compatibility.

General Electric and Westinghouse are the leading U.S. suppliers of large electric energy system equipment to Indonesia. Both firms offer oil-fired steam power plants as well as gas turbines. In addition, both firms offer a full range of switchgear, transformers, and other electric equipment so that they are able to install complete power plants and distribution/transmission systems.

U.S. suppliers have a strong position in the diesel generator market. Such firms as Cummins and Caterpillar have commanding positions in the large diesel generator sales. Although these firms often manufacture offshore, the bulk of their generator sets come from the United States.

The Caterpillar Tractor Company offers diesel power units in the 85- to 1,500-hp (63 to 1,118 kW) range. The Detroit Diesel Allison Division of General Motors Corporation (General Motors) offers generator sets from 25 to 935 kW. The Electro-Motive Division of GM sells diesel generator sets in the 700- to 1,800-kW range. The Enterprise brand of diesel engines from the Enterprise Engine and Compressor Division of DeLaval Turbine, Inc. enjoys a good reputation in Indonesia. The range includes very large engines for major projects.

The Onan Corporation sells gas and diesel electric generator sets in output up to 500 kW. The Waukesha Engine Division of Dresser Industries sells their range of diesel generator sets varying in output from 60 to 350 kW. In addition to the gas turbines offered by Westinghouse and General Electric, the General Dynamics Corporation offers Pratt and Whitney gas turbines; while International Harvester Corporation has installed their Solar, Centaur, Saturn, and Titan models of gas turbines ranging in size from 60 to 2,500 kW.

Other U.S. suppliers in the market include Babcock and Wilcox, Square D Company, Foster-Wheeler, Bailey Meter, Struthers Wells, Allis Chalmers, White Motor Corp., Williams and Lane, Niagara Company, A.B. Chance Company, and McGraw Edison.

Ways to Improve U.S. Suppliers' Market Position

When discussing how U.S. suppliers might improve their market position, Indonesian end users most often mention credit, delivery, and local service. There is general agreement that if U.S. suppliers can offer better credit terms, they would be able to obtain a larger market share. Interest on loans in Indonesia is high, and cash funds are not available, although the requirement for equipment is very great, and the medium- and long-term ability to pay is good.

Many U.S. suppliers are weak on credit and delivery. End users and agents emphasize the importance of credit terms and quick delivery in order to win sales. They suggest that American suppliers try to stock goods in Indonesia using bonded warehousing facilities so that the goods will be available for sale immediately upon customer request.

One major distributor of U.S. diesel generators emphasized the importance of credit when he said:

The big problem in marketing diesel generator sets is credit. The buyer wants 2 or 3 years' credit and it is difficult for us to extend that to them. There is a very high interest rate here. If the cost is 100 million rupiahs, then you have to put up 150 million rupiahs as collateral to the bank, and then on top of that, the interest rate is 2.2% per month. The Americans are behind on credit facilities for small sales. The English BOEC supplies credit through the Midland Bank. They guarantee suppliers and the interest rate is only 12% per year or about 1% per month and no collateral is required.

U.S. firms generally have a good reputation regarding service and support activities. For example, the Caterpillar service and spare parts program in Indonesia is often cited as being comprehensive and fast. However, a number of U.S. firms could improve their support activities in Indonesia since a number of equipment items have been sold in the country with no service or spare parts facilities. Such sales often result in dissatisfied customers when breakdowns occur and service is not available.

It is important for U.S. suppliers to keep the specific technical requirements of Indonesia in mind.

Because of the colonial Dutch background of Indonesia, most officials involved in electric power generation were trained in the European traditions and standards.

Promotional Programs

Major agents and buyers in Indonesia have expressed interest in wider contacts with American electric power equipment firms. Ignorance prevails regarding the offerings of many U.S. firms and the possibilities for new American equipment techniques and systems. Some agents mentioned their interest in knowing more about the smaller American suppliers who have high-quality products. These agents suggest that programs be instituted whereby they could make direct contact with such suppliers. However, such firms entering the Indonesian market should be certain to make a full commitment to the market in terms of fast, attentive delivery, spare parts, and credit services.

Sales to PLN and to large investors require detailed monitoring of plans and tenders by men on the scene in addition to continuing coordination with the home offices of the suppliers. This latter aspect is particularly true when considering the large American oil companies that often make purchase decisions in their U.S. home offices.

Marketing strategies should be tailored to the target market. In the case of sales to PLN, financing should be given prime consideration. Financial packages acceptable to the Indonesian Government should be formulated. In addition, continuing contact with PLN engineers and management personnel through seminars and technical presentations would be useful.

In the case of the captive market, participation in trade exhibitions combined with newspaper advertising is effective in reaching end users and potential agents. Newcomers to the market should place prime emphasis on establishing a good agent or dealer network. Also, customer training on repair and maintenance of equipment is essential for continuing growth in the market.

Food Processing and Packaging

The food processing and packaging industry is characterized by great contrasts, in both its methods of operation and the size of its establishments. The years between 1970 and 1976 were marked with change as large international investors brought capital, specialized equipment, international sanitation standards, and automation to the industry; nevertheless, most firms are small and are still using old machinery and labor-intensive operations.

In 1975 the total market for food processing and packaging equipment was estimated at \$42.5 million, 108% over the 1973 figure. Projections for 1980 indicate sales of \$82 million, including \$35.6 million for food freezing and refrigeration equipment, \$29.9 million for food processing equipment, \$10.9 million for food packaging equipment, and \$5.6 million for grain milling equipment.

Government support, increasing urbanization, and exposure to imported processed foods will aid expansion of the industry. However, existing problems of refrigeration, sanitation, and distribution must be resolved; additional funding for capital improvements, upgrading of technical know-how, and development of managerial skills also are needed.

The time is opportune for U.S. suppliers to enter the food processing and packaging equipment market, as middle-size businesses planning future expansion have not yet established machinery preferences. U.S. manufacturers have ample opportunity to demonstrate their products, to work with local end users in building expansion programs, and to establish the kind of relationships that will lead to sales in the near future.

INDUSTRY STRUCTURE AND SIZE

In 1973 the industry consisted of 15,930 firms—a 44% increase over the 1970 figure of 11,000. During the same 3-year period, employment in the sector rose 142%, from 240,000 employees to 581,362 in 1973 (see table 1). Approximately 200 firms are large-scale, fairly modern operations, another 1,200 are medium-size firms, and the remainder are small but productive family-owned and operated businesses. About 260 companies are involved in produc-

Table 1.—Indonesia: Food Processing and Packaging Establishments, Large and Medium, 1973

Type	Number of Firms	Number of Employees
Food, Beverages and Tobacco Manufacturing ..	15,930	581,362
Meat Products	37	5,002
Dairy Products	558	5,722
Preserved Fruits and Vegetables	7	1,086
Grain Milling		
Rice Milling	7,525	55,522
Wheat Milling	7	518
Grain Milling	124	2,635
Bakery Products	548	10,373
Sugar and Confectionery Products		
Sugar Factories and Refineries	26	290
Chocolate Powder, Chocolate, and Sugar Confectioneries	135	5,025
Fats and Oil Processing		
Coconut Oil	398	10,200
Other Vegetable and Animal Oils	82	6,712
Beverage Productions		
Alcohol and Spirits	20	1,264
Wine	29	765
Beer	2	510
Soft Drinks	212	3,413
Fisheries, Fish, and Seafood Processing	182	5,951
Other		
Coffee (Peeling and Cleaning)	141	24,096
Coffee (Fried and Coffee Powder)	132	1,321
Tea Processing	241	68,835
Noodles, Macaroni, etc.	393	8,387
Block Ice and Ice Cubes	290	4,818
Krupuk (Shrimp Chips) and other Chips ..	416	5,832
Drying and Processing Tobacco	1,144	80,082
Clove Cigarettes	20	5,817
Other Tobacco Products	74	4,667
Miscellaneous ¹		
Containers	3,316	263,846
Paper and Cardboard Containers	19	974
Metal Containers	56	2,993
Glass Products	56	4,989

¹ Includes all registered paper, metal, and glass container manufacturers. Breakdown as to specific use is not available.

Source: Central Bureau of Statistics, Department of Industry.

tion of both alcoholic and nonalcoholic beverages. Food processing companies are distributed unevenly throughout the country, with East Java, an important center, accounting for 3,519 firms (22%) employing a total of 93,218 persons. Although the food processing sector is relatively small, it produces a wide range of foods—fruits and vegetables, meats, dairy products, bakery goods, cooking oils, seafood, candy, and snack food. Processes include canning, freezing, baking, milling, and extraction.

Meat and Poultry Products

Meat comprises a very small portion of the Indonesian diet: per capita consumption is only about 3 kg per year. Fresh chicken has always been part of the Indonesian diet, but only recently have cuts of freshly slaughtered beef and pork¹ appeared in any appreciable quantity. Even so, the amount is small, fairly well centered in urban areas, and intended primarily for upper-class consumption and hotel food services.

Butchering techniques are simple, handtools being commonly used.

Sanitation conditions in the slaughterhouses and lack of refrigerated transportation have hindered development of this sector; in all but the major companies these factors still present serious problems.

Meat production has not increased significantly over the past decade (see table 2). Management difficulties and a limited supply of beef have held production to a minimum. Early in 1976, three new fresh meat processing plants had received abattoir licenses and were under construction. A facility in Surabaya, started with financial aid from Belgium, was completed in 1976.

The best beef cattle are presently exported to Singapore. Any growth in meat processing is dependent upon an increase in the number of cattle raised for domestic consumption, improvement in their quality, availability of refrigeration, and better regulation and enforcement of sanitary conditions.

¹ Eating pork is prohibited according to the religious law for Indonesia's Moslems, but is widely practiced among the Chinese, Christian and other minority groups.

In 1975, 21 firms were registered as processing meat and fish. Of those, two, both meat canners, process to international standards. N.V. Canning Indonesia Products (C.I.P. brand), founded on Bali by the Japanese in the early 1940's, in 1976 was producing 3 million cartons per year of canned meat products such as corned beef and sausages. While P.T. Mantrust (Management Trust Company) produces canned meat as only a small part of its operations, it does can corned beef for domestic consumption.

A great deal of canned meat is imported from Australia and New Zealand, and increasing amounts are coming from China and Taiwan. For example, Hero's the largest supermarket chain in Jakarta, buys all its canned meat abroad, prepared with house brand labels.

Imported frozen products, primarily from New Zealand, Singapore, and Australia, have been the major meat source for many years. The steady growth of beef imports between 1970 and 1974 (see table 3) was attributed to demand from new hotels, increased tourism, and workers on major oil projects. In 1975 and 1976 two firms, one a major exporter of frozen shrimp and the other a major canner, began planning and test production of domestically frozen meat.

Poultry as a commercial venture has had mixed results. In 1976, eight firms in Jakarta and two in Bandung were raising poultry, and a domestic investment application had been filed for a company in Tangerang, West Java. These operations vary from mass chicken-raising ventures to little more than barnyard operations. Large poultry-raising ventures

Table 2.—Indonesia: Meat Production, 1969-74
(in tons)

	1969	1970	1971	1972	1973	1974
Beef	164,982	167,285	177,176	196,176	213,882	153,956
Buffalo meat	48,499	49,176	52,083	57,127	62,954	48,400
Goat	12,032	12,200	12,921	13,915	15,435	31,742
Sheep	9,650	9,785	10,364	10,986	12,206	19,337
Pig	34,178	34,655	36,704	38,620	41,355	59,411
Poultry	39,188	39,736	42,086	42,140	56,848	79,580
Total	308,529	312,837	331,334	358,964	402,680	392,426

Source: Central Bureau of Statistics.

Table 3.—Indonesia: Beef imports, 1970-74

Country of origin	Gross weight (tons)					Value (US\$1,000)				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Singapore	5	7	29	149	122	11	5	49	431	327
Australia	28	3	46	129	140	30	4	73	292	326
New Zealand	4	15	11	55	47	6	13	26	139	60
U.S.A.	6	4	2	22	28	16	11	9	53	71
Other	3	3	3	28	7	3	8	5	62	89
Total	46	32	91	383	344	66	41	162	977	803

Source: Central Bureau of Statistics.

depend on the tourist industry, restaurants and hotels, and the upper class for their market. The remainder of the population cannot afford commercially raised poultry. Also, most local consumers prefer the taste, as well as the price, of home-reared chickens.

The broiler industry has been restrained by marketing, transportation, and feed problems; nevertheless, industry sources predict an increase in the number of broilers from 2 million in 1975 to 5 million by 1980.

Commercial poultry processing is in its infancy. P.T. Kemchicks of Jakarta, which raises chickens from U.S. stock, sells fresh and frozen poultry and is equipped with plucking and other processing machinery. Two prominent food processing companies were investigating joint-venture possibilities for poultry breeding, raising, and processing. An experimental turkey farm was begun several years ago, but the climate and disease decimated the flock. In addition, turkey met with consumer resistance although it was meatier and cheap per pound to raise and sell.

Dairy Products

The primary dairy products in Indonesia are sweetened condensed milk and ice cream. Production of specialty products such as powdered baby food formulas and milk-base health foods is increasing. Butter, cheese, and liquid milk represent only a small share of the market. Most dairy products are made from powdered milk imported from Australia and New Zealand.

Imports of milk powder rose 62%, from 15,696 tons to 25,479 tons, between 1969 and 1973. In the same 4-year period, a drop in imports of sweetened condensed milk from 4,205 tons to 253 tons gave rise to predictions of a boom in the local dairy industry.

However, producers have experienced difficulty in increasing customer acceptance of dairy products, except ice cream. Sales of all dairy goods reached a plateau in 1974-75, refuting the more optimistic growth predictions of the early 1970's. The lack of refrigeration and the low exposure to milk products as part of the daily diet are basic factors in the failure of dairy products sales to increase significantly. Although the industry is struggling to expand this market, it does not foresee major growth over the next few years. (Also see "Animal Husbandry" under Agro-Industry.)

Fresh milk is almost nonexistent in Indonesia, and the small available amounts are low grade; thus it is a poor option for use in the industry. For example, a condensed milk factory producing 500,000 cases annually would require 120,000 kg of fresh milk per day. In 1976, one firm was able to obtain only 1,000

kg per day. The Government required the company to pick up and process this small amount at a very high cost per unit, including the purchase of special sterilizing equipment.

Of the nearly 600 firms registered as producers of dairy products, 7 large, modern operations dominate (see table 4). Four major processors of sweetened condensed milk together produce 5.4 million cases annually. (One case equals 48 cans; each can contains 14 ounces.)

Table 4.—Indonesia: Major Producers of Dairy Products

Name and Location	Major Product
P.T. Indomilk (Jakarta)	Sweetened condensed milk Vegetable milk Butter
P.T. Friesche Vlag Indonesia (Jakarta)	Sweetened condensed milk
P.T. Food Specialties Indonesia (Surabaya)	Sweetened condensed milk and vegetable milk Full cream powder milk (Dancow) Modified infant formula (Lactogen)
P.T. Foremost Indonesia (Ciracas)	Sweetened condensed milk and vegetable sterilized milk
P.T. Ultra Jaya Milk Industry & Tradco (Bandung)	Liquid sterilized milk
P.T. Kebun Bunga (Jakarta) ..	Milk powder repacking plant
Sari Husada (Jakarta)	Milk products

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

P.T. Food Specialties Indonesia, Surabaya, is a joint venture between Nestle Alimentana of Switzerland and Indonesian investors. Its clean, modern \$1.5-million plant produces a yearly total of 500,000 cases of sweetened condensed milk, 5,500 tons of full cream milk powder, 600 to 800 tons of Milo powdered chocolate health drink, and other dietetic products. Each year since 1973, when full production began, the company has added another product line. In 1977, cereal production will be initiated. Equipment is from Switzerland, France, Denmark, England, and the United States, and three can lines supply the packaging needs.

P.T. Foremost (Indonesia), a joint venture in Jakarta with Foremost McKesson, United States, Fen Hin Chon, Hong Kong, and P.T. Wardhana, produces sweetened condensed milk and sterilized vegetable milk. Both of these products are "filled" milk with the butterfat replaced by palm oil. Originally, Foremost was the only dairy permitted to use palm oil in milk production, but now all dairies have been granted this option. Foremost has petitioned the Government for permission to use butterfat as well. Foremost has its own can lines.

P.T. Indomilk, Jakarta, is a joint venture between Jakarta and Hong Kong business firms and the Australian Dairy Board. In 1969, it opened its \$2.2-million sweetened condensed milk plant, the largest in Southeast Asia, with an annual capacity of 1 million cases. In 1970, Indomilk began production of recombined liquid milk utilizing fluid whole milk and reconstituted powdered milk. The product is packaged in cylindrical, semiflexible paper cartons, and must be refrigerated. Estimated production in 1976 is 1 million liters. Small amounts of butter and cheese are also produced. Can lines and paper packaging equipment meet production requirements.

The domestic firm of P.T. Ultra Jaya Milk Industry and Trading Company, Bandung, utilizes specialized equipment from Italy and Switzerland. Its sterilizing and packaging process recently entered the dairy field to produce reconstituted whole milk that stays fresh for several months without refrigeration. (This process is being watched by others in the food processing sector as a practical solution in a country where refrigeration is limited and cans are expensive.) Available in the stores in 500-ml and 1,000-ml paper "Tetra Paks," "Ultra Milk" is rapidly gaining consumer acceptance.

All the above-mentioned firms process to international standards and use continual testing and sanitation standards to maintain high quality.

P.T. Sari Husada, a joint venture between P.T. Kimia Farma and P.T. Tiga Raksa, produces 1.5 million tons of powdered milk products per month under the brand names SGM, FLM, S-26, and Quaker Oats. Its expansion plans include production of specialty products similar to Milo or Ovaltine in the near future. The company has 245 employees, 8 of whom are university graduates.

Sari Husada imports account for 30% of the needed raw materials including skimmed and whole milk from New Zealand. Sugar, essential oils, and rice are purchased locally. A long-range plan to upgrade facilities was initiated in 1972; equipment has been purchased from the United States, England, Switzerland, Italy, Germany, and New Zealand.

Ice cream and ice milk products made from imported powdered milk became very popular when production began several years ago. However, industry sources now feel that the number of firms presently in the field exceeds the market potential. Overproduction, coupled with inexperience in managing and marketing, has caused many small firms to go out of business and several of the more stable firms to seek outside expertise.

P.T. Sudari, Medan, is an integrated, domestic operation with its own dairy herds, ice cream factory, and distribution system. Operations began in 1974 with 26 cows. Facilities include a dairy farm, ice cream manufacturing plant, refrigerator and freezer

trucks, and bicycle-driven carts for neighborhood street sales. Most of their equipment is from the United States. The plant is relatively well equipped, but many of the operations remain labor-intensive, such as hand insertion of popsicle sticks.

Although well-run and managed, P.T. Sudari met with financial difficulties, due to inexperience in pricing and marketing. In 1976, a management arrangement with Carnation was being considered. The quality of the dairy herd and the processing operations would have to be improved before the Carnation name could be used. This arrangement could aid P.T. Sudari in building a solid business foundation, and assist Carnation in entering into other Indonesian markets.

It is reported that other major ice cream manufacturers have sought managerial assistance by utilizing the Executive Service Corps, a service exchange arrangement for retired U.S. business executives.

Several brands of ice cream, such as Peter's, Woody, and Diamond, are produced in sanitary conditions and to high-quality standards, but many small companies produce items of low or inconsistent quality.

Preserved Fruits and Vegetables

For more than 30 years, fruits and vegetables have been canned commercially in Indonesia; yet in 1976, only 5 firms were involved in this process, and those on a limited scale (see table 5). Dried fruits are a standard item in the local markets, and jams and jellies are domestically produced.

Five factors have kept the processing of fruits and vegetables from becoming a major domestic enterprise: (1) cost, with the can adding 40% to the unit price; (2) questionable quality in earlier days of processing, which left people suspicious of locally processed foods; (3) competition from readily available, high-quality imported goods; (4) easy access to inexpensive, fresh fruits and vegetables; and (5) difficulty in obtaining sufficient fruits and vegetables of a quality suitable for processing. For example, tomatoes and oranges have not proved suitable for

Table 5.—Indonesia: Major Producers of Preserved Fruits and Vegetables

Name and Location	Major Product
P.T. Nichi Mazen (Teluk Betung)	Canned foods
N.V. Canning Indonesia Product (P.T. Cip) (Bali)	Canned foods
P.T. Tarwis (Menado)	Canned fruits, vegetables
P.T. Pineapple Cannery of Sumatra (Pematang Siantar)	Canned pineapple
P.T. Mantrust (Jakarta)	Canned fruits, vegetables

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources

canning. Experiments in growing new varieties have not always been successful but are continuing.

Store shelves display a wide variety of imported canned items from the Netherlands, United Kingdom, United States, Australia, and increasing amounts from Taiwan and China. Major U.S. brands such as Campbell, Heinz, Del Monte, Libby, and Skippy are available, but at very high prices. A can of Campbell's Tomato Soup which sells for \$.21 in the United States and \$.25 in Hong Kong costs over \$1.00 in Jakarta.

On Sumatra, a promising corn-raising project yields crops for export to Japan, and several truck farming operations in North Sumatra grow produce for Singapore outlets. At present, the products of these ventures are exported as fresh commodities; however, their very existence suggests the possibility of growing quantities of produce sufficient to sustain canning or other processing operations.

An experiment in food processing began in North Sumatra in the mid-1970's with the opening of P.T. Pineapple Cannery of Sumatra, Pematang Siantar. This joint venture includes a wealthy Indonesian family and interests from Singapore, Taiwan, and Japan, and was established to process "Geisha" brand pineapple for export. The plant is modern and well equipped, with machinery from Taiwan and Japan. In order to assure an adequate supply of fruit, an active extension program was initiated with local landholders. It provided new plantings, agricultural assistance, and in some cases, small loans for land improvement and equipment. This enterprise produces high-quality pineapple and has more orders than it can fill. Although the program has assisted in improving quality, as of mid-1976 the company had been unable to establish supplies of fruit sufficient to operate beyond 50% to 60% of plant capacity. However, as younger plants continue to mature and more local farmers are enrolled, the operation should become increasingly successful.

P.T. Mantrust, the largest producer of canned goods in Indonesia, is a private holding company for six wholly owned food processing operations as well as a sales distribution company, two hotels in Surabaya, and a restaurant in Bandung. Mantrust also has partial interest in a variety of firms such as P.T. Friesche Vlag Indonesia. Output from six processing plants includes canned fruit, mushrooms, asparagus, corned beef, shrimp, tuna, frozen meat, cookies and crackers, and macaroni. Local markets provide outlets for 80% of total production. Some items such as mushrooms, shrimp, and tuna are put up primarily for export, while others such as corned beef, cookies, and crackers are for domestic consumption.

Dutch advisors oversee Mantrust's food processing operations and sales distribution. Borsumy Whery Indonesia (BWI) is a wholly owned Indonesian com-

pany which has connections with Borsumy Whery (BW) in the Netherlands. BWI handles the distribution of all P.T. Mantrust products through its 20 branches in Indonesia.

P.T. Mantrust has combined automation for quality control with labor-intensive operations to conserve capital investment. They buy heavy equipment from manufacturers in Germany, and lightweight items and meatpacking equipment from firms in Taiwan. Machines from the United Kingdom were used to expand the production of biscuits. A special machine imported from Italy processes macaroni.

A three-line can factory combines equipment from companies in Taiwan, Japan, and Germany, to produce 60,000 units per hour. The can lines fill all P.T. Mantrust requirements plus the needs of several other firms. A few units of packing equipment have recently been purchased from U.S. manufacturers.

In mid-1976 several well-known firms from the United States, Europe, and Japan were investigating arrangements with Indonesian food processors for domestic production. Some problems to be resolved were the balance between imported processed items, intermediate processing, and domestic production; and equipment purchase arrangements. These negotiations were expected to bring some well-known names into the Indonesian food processing industry.

Grain Milling

The two major grain products are milled rice and wheat flour.

Rice production in Indonesia amounted to 15 million tons in 1975, falling short of the national requirement for 17 million tons; the difference was imported. Most rice is milled at small farmer cooperatives, and mills of varying size are located throughout the islands. In 1973, the 7,525 rice milling operations employed 55,522 persons. Much of the equipment is from the Netherlands and is old, but adequate for the basic process of hulling and cleaning. Traditionally, Indonesian Chinese entrepreneurs have dominated the rice milling industry.

Badan Urusan Logistik (BULOG, the National Logistics Board) has the responsibility of managing the milling, distribution, and import of rice as part of an effort to stabilize rice prices and to provide a better income for local farmers by reducing the role of Chinese middlemen. (See Agro-Industry for a detailed discussion of rice production and BULOG.) Since 1974 most milling has been done through agricultural cooperatives and government-operated mills.

In the production of wheat flour, Indonesia has made serious moves into intermediate processing. Whereas the country formerly imported wheat flour, it now imports over 800,000 metric tons (MT) of

wheat grain, primarily from Australia and the United States, and three flour mills can fill present and projected domestic requirements. Experiments to grow wheat for flour have not been successful, and wheat grain will remain an import item for many years. All wheat flour is for domestic consumption and must be sold through distributing companies appointed by BULOG.

P.T. Bogasari Flour Mills, a joint venture between Italian investors and well-connected Indonesian business interests, began operations in 1972. Two mills in Jakarta and Surabaya are working to capacity, producing 2,700 and 700 tons per day, respectively. The mill in Surabaya was being enlarged in 1976 to reach an 1,800-ton per day capacity. When the expansion is completed, Bogasari will be one of the largest milling operations in the world. Both plants have been built by and are operated in consultation with Italian advisors and use Italian Okram milling equipment supplemented by a few Swiss Buhler machines.

P.T. Prima Indonesia, Ujung Padang, has a milling capacity of 1,000 MT per day and is equipped with machinery from Germany and Switzerland.

Construction of a fourth mill has been considered, but the need has been seriously questioned. Also it has not been determined whether, if built, such a mill would be a new company or an expansion program at one of the existing mills.

Bakery Products

Sales of bakery goods have been increasing in the past 3 years. Wheat products, still relatively expensive for the average Indonesian, are now part of the standard diet. What was once imported fare for the wealthy—a wide variety of bread, rolls, and biscuits (cookies)—is now locally produced and available from stores, markets, and bicycle vending wagons.

The 548 bakeries, employing 10,373 people, range in size from small family enterprises using old Dutch equipment to the top 20 producers who combine modern technology with labor-intensive operations. Table 6 lists the major producers.

The American Bread Company (A.B.C. Bakery), Surabaya, producers of Rainbo and Holland brands bread, is a sister company to P.T. Pabrik Coklat Cendrawasih. Production began in 1971 and by 1976 reached a level that requires 200 pecks of flour per day. Old equipment from the Netherlands has been supplemented with rollers from China; mixers from Germany, Taiwan, and the Netherlands; and a Rolo Revent oven from Sweden. Most shaping, handling, and bagging operations are done by hand. The company has worked to attract buyers by keeping prices low (a small loaf costs \$.08 and a large loaf \$.19), introducing novelty products such as "Crocodile

Table 6.—Indonesia: Major Producers of Bakery Products

Name and Location	Major Product	Annual Capacity in tons
P.T. White Satin Bakery Confectionery (Jakarta)	Production bread, cake, cookies	352.5
P.T. Inbisco Djaja (Jakarta) ...	Cookies, crackers	1.5
C.V. A.B.C. Bakery (Jakarta) ..	Bread	480.0
P.T. Khong Guan Biscuit Factory Indonesia Ltd. (Jakarta)	Cookies, crackers	10.0
C.V. "Jaja" (Jakarta)	Bread	2.4
Fa. Indrys Bakery Confectionery (Jakarta)	Bread, cake	42.0
P.T. United Biscuit Manufactory (Jakarta)	Cookies, crackers	4.5
P.T. Marigold Bakery (Jakarta) ..	Bread, cake	2.4
P.T. Lonbisco (Jakarta)	Cookies, crackers	1.8
P.T. United Biscuit Manufactory (Surabaya)	Bread, cookies	3.0
P.T. "Marigold Bakery" (Surabaya)	Bread, cake	1.4
P.T. Nissin Confectionery Co., Ltd. (Jakarta)	Bread, crackers	5.0
P.T. Djojoberjo Oriental (Jakarta)	Bread, cake	2.3
P.T. Fuji Bogasari (Jakarta)	Bread	12,000.0
C.V. Chandra (Ujung Pandang) ..		4.0
P.T. Robinson International Biscuit & Confectionery Factory Ltd. (Jakarta)	Cookies, crackers	5.4

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

bread" and chocolate rolls, and using a system of neighborhood delivery routes by bicycle cart.

Several firms specialize in cookies and crackers; among them are P.T. Khong Guan Biscuit Factory Indonesia Ltd., Jakarta, with an annual production of 10,000 tons, and P.T. Nissin Confectionery Company Ltd, Jakarta, 5,000 tons. At Khong Guan all cutting, handling, and packing operations are manually done. The sole piece of equipment is a Nissin oven from Japan.

Sugar and Confectionery Products

Because Indonesians prefer foods with a high sugar content, the sugar and confectionery products market should enjoy steady growth. The number of sugar factories and refineries more than doubled between 1972 and 1973, from 11 firms with 145 employees to 26 firms with 290 employees. Over the same period, however, the number of chocolate and sugar confectionery manufacturers remained at 135 with only a 9% increase in the number of employees.

Sugar milling takes place at the plantation level (see Agro-Industry) and produces a coarse sugar of inconsistent quality. The wide variations in this output place difficulties on the production of direct sugar items, such as chocolate and candy, and on other processes, such as jelly making and fruit canning. In 1976 there were no plans for additional refining operations, but industry sources state that both expan-

sion and modernization are prerequisites to growth in confectionery production.

Six major firms dominate chocolate production: four in Surabaya are P.T. Pabrik Coklat Cendrawasih, P.T. Welco, P.T. Kayra Nusantara, and Bujana Karya and two joint ventures in Bandung are Van Houten (the Netherlands) and Windrollen, (a union of several interests). Van Houten, Windrollen, and Cendrawasih produce about 20 tons each per month, with the other three manufacturing 10 tons each, giving a total monthly production of 90 tons. This total includes bar chocolate, chocolate powder, and rice chocolate (granulated chocolate "sprinkles").

Most ingredients such as cocoa beans and sugar are domestically produced. Vanilla comes from France, and other flavorings from the Netherlands and the United States. Output is for domestic consumption with export possibilities not being considered until at least 1981.

P.T. Pabrik Coklat Cendrawasih, founded in 1938 by the Dutch, was nationalized in 1958 and now is a government-private domestic joint venture. Sales were increasing 10% to 15% annually until the 1973-74 inflation cut business severely. Recovery was beginning in 1976, and plans were being laid for expansion in the near future.

Cendrawasih operates one shift with 130 employees and produces 20 tons of chocolate and chocolate products per month. This total includes three sizes of chocolate bars (\$.03, \$.18, and \$.24) in seven flavors. A new product is the \$.24 Mambo bar, a chocolate-dipped, filled wafer. Rice chocolate is sold in 100-g bags for \$.16, and chocolate powder in \$.05, \$.19, and \$.62 cans.

Equipment, including cookers and mixers, is basically the original Dutch machinery, and all candy is hand wrapped and boxed. In 1968 a Bauermeister processor with a capacity of 100 kg per hour was purchased, but it cannot be used due to incompatibility with the existing machinery. However, Cendrawasih is investigating the purchase of an entire candy machine line to mass produce candy bars and novelty items.

The company also maintains a spare parts stockpile, a shop which makes additional parts, and a labor-intensive can factory to meet packaging needs.

Company practice is to train employees and maintenance people through an on-the-job apprentice program and offer supplementary benefits and pensions to employees who remain 3 years or more. This policy has built employee loyalty and allowed the firm to keep trained personnel. Several employees have been with the firm for 15 to 20 years.

There are many other firms of various sizes making other sweets such as hard candies, fruit and nut candies. Although most are still labor-intensive op-

erations, a few have modernized with various degrees of automation—for example, Hawaiian Confectionery Factory, Jakarta, uses an Economy (Germany) steam boiler and Roche (Germany) and G.T. (Italy) wrapping equipment in its candy factory.

Fats and Oil Processing

The three major food oils produced in Indonesia are palm, coconut, and corn, table 7 lists major processors of fats and oils.

Table 7.—Indonesia: Major Processors of fats and oils

Firm	Location	Production
P.T. Unilever Indonesia	Jakarta	Coconut oil
Firma Pengadegan (Pabrik Minjak Goreng "Bataco") .	Jakarta	Coconut oil
P.T. N.V. Gadjah Mas, Pabrik Minjak	Jakarta	Coconut oil
Pabrik Minjak Goreng & Sabun "Costa"	Jakarta	Coconut oil
N.V. "Banjoemas," Pabrik Minjak	Jakarta	Coconut oil
Pabrik Minjak Goreng "Barco"	Jakarta	Coconut oil
Pabrik Minjak "Hap Goan" .	Jakarta	Coconut oil
P.T. Djernih (VETCO)	Jakarta	Coconut oil
Pabrik Minjak Kelapa "KUNAR"	Semarang	Coconut oil
P.T. Nila Kandi	Jakarta	Coconut oil
Pinda Nababi Yasa	Jakarta	Peanut oil
International Corporation ..	Jakarta	Corn oil products
P.T. Filma	Surabaya	Margarine and oil
Indocorn (Indonesian Corn Products)	Surabaya	Corn oil; process 240 tons of raw corn a day to produce 4.5 tons of oil
P.T.P. (Estate Corporation) III, V, IX & X	North Sumatra	Palm oil
P.N.P. (State Plantation Corporation) I, II, VI & VII	North Sumatra	Palm oil

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

Palm oil is produced at the plantation level through the the State plantations, (see Agro-Industry for full discussion of palm oil production). The majority of processing facilities, for basic pressing and extraction operations, are equipped with old cookers and belt and pulley systems from the Netherlands. In early 1975, to increase domestic supplies, two plants near Medan were expanded to include fractionating operations, and industry sources say that two more such facilities worth \$25 million each are under consideration.

Coconut oil production is concentrated along the northern coast of Java near the port areas, and over 50% of the firms are located near Jakarta. Of the approximately 400 firms producing coconut oil, the majority are privately owned and of small or medium size. Over 10,000 people are employed. The

following tabulation shows coconut oil production (in thousands of tons) from 1970 to 1975.

<i>Year</i>	<i>Production</i>
1970	216.5
1971	248.4
1972	269.4
1973	290.0
1974	351.1
1975	275.3

During the colonial period, coconut oil was a major export item with annual sales of over \$60 million, but the industry has gradually deteriorated. In spite of growth in production, the export of coconut oil in 1973 was banned in order to insure sufficient supplies for domestic use. The mills use oil pressing and extraction equipment, imported primarily from the Netherlands before the 1930's.

Corn oil processing came to Indonesia in 1975 with the opening of the Indocorn (Indonesian Corn Products) plant near Surabaya, which is still the only plant of its kind in Indonesia. Trial production began in February of that year, and approval for commercial production came in September.

Indocorn works three shifts at 100% capacity to process 240 tons of raw corn per day. Production includes:

Corn oil	4.5 tons/day
Coarse grits	85.2 tons/day
Medium grits	56.4 tons/day
Fine grits	27.6 tons/day
Corn bran	47.5 tons/day
Maize cake meal	15.3 tons/day
Soap stock	400.0 liters/day

In 1976, all production was slated for domestic use and was distributed through 10 agents on Java and Sumatra. Plans were being drawn up for expansion of sales to the other islands. Indocorn officials were also looking to export markets, first in Australia and the Middle East, and then to other countries after a projected 1978 expansion.

Corn is purchased through local cooperatives—on Java from September to February, and on Sumatra and Sulawesi from February to September. Less than 5% of the raw corn was imported in 1976, and plans call for self-sufficiency within 2 years.

Some basic cookers and crushers were locally produced, but the majority of the milling and processing equipment is from Ikram (Italy). The initial sales arrangement included 3 months of training in Italy for the plant manager, who is an engineer; the services of three Italian advisors, who spent 2 months in Indonesia supervising installation and training workers; the training of two maintenance engineers in Italy; and a 2-year stockpile of spare parts.

Beverage Production

After a slow start plagued by processing production problems and difficulties of quality control, production of bottled beverages is showing major growth. In 1973, 20 firms employing a total of 1,264 employees were registered as producers of alcohol and spirits, 29 firms with a total of 765 employees as manufacturers of wine, and 2 firms with 510 employees as makers of beer. There were also 212 soft drink producers employing 3,412 people (see table 8 for major producers).

The large firms process and bottle under modern, sterile conditions, but many of the small ones lack sanitation measures. Limited refrigeration has apparently not hampered beverage sales—soft drinks sometimes are consumed at room temperature, and beer is served over ice.

P.T. Brasseries de l'Indonesie, Medan, was founded in 1973 as a joint venture between Glacieres Internationales (France) and Mr. Hutabarat, president of P.T. Fabrik Es Siantar (North Sumatra). The modern \$1.9-million plant employs 100 persons and has an annual production of 60,000 hl of beer, 30,000 hl of soft drinks, and 30,000 tons of ice. Output includes Bir Baris (beers); the U.S. franchises Coca-Cola, Fanta, Sprite, and Bireley's Orange; and the French franchise Top. Brasseries products have gained rapid consumer acceptance, and it is not unusual to see passengers on the airplanes from Medan to Jakarta carrying Brasseries cartons.

Bottling equipment in the plant is from France and Italy; bottles, caps, and labels are domestically produced. Drink concentrates are from the United States and France.

P.T. Djaya Beverages Bottling Company, Jakarta, is a joint venture between Mitsui Toatan Chem Inc. and Mitsui and Co. Ltd. from Japan (60%), and N.V. Indonesian Bottlers Ltd. (40%) with a base \$1-million investment. The company employs 495 Indonesians and 5 foreign nationals and produces 300,000 crates per month of Coca-Cola, Fanta, and Sprite. Monthly capacity would be 420,000 crates if both filling machines were operated full time. Concentrate is imported from the United States but will be available locally in 1977 when the Coca-Cola Co. (U.S.A.) completes a concentrate factory now under construction in Cibinong. The concentrate plant will include used equipment purchased in Australia.

P.T. Djaya distributes solely through P.T. Enam Sekawan, which has four warehouses—at Jakarta, Bogor, Bandung, and Cirebon—and a fifth under construction in Serang. P.T. Enam Sekawan owns 100 large and small transport vehicles and plans to expand its fleet in the near future.

Other large soft drink producers and their annual output include P.T. Indonesia Fruit Flavour Cor-

Table 8.—Indonesia: Major Producers in the Beverage Industry

Name and Location	Major Product
P.T. Perusahaan Limun Indonesia (Tangerang)	Soda water, syrup
P.T. Brasseries de l'Indonesia (Medan)	Soft drinks, beer, Ice
P.T. Djaya Beverages Bottling Co. (Jakarta)	Soft drinks
P.T. Sinar National Bottling Industry (Jakarta)	Soft drinks
N.V. Prem Bottling Co., Ltd. (Jakarta) ...	Soft drinks
P.T. Indonesia Fruit Flavour Corp. (Jakarta)	Soft drinks
N.V. Perindustrian Dainang (Medan)	Soft drinks
Fraser & Neave (Jakarta)	Soft drinks
P.T. Delta Djakarta (Jakarta)	Beer
P.T. Perusahaan Bir Indonesia (Surabaya, Jakarta)	Beer, Soft drinks, 7-Up, etc.
Mitsui Toatsu Chemicals (Jakarta)	Soft drinks
P.T. Tirtorejo Abadi (Surabaya)	Pepsi Cola bottling
Coca-Cola Ltd. N.V. (Jakarta)	Coca-Cola bottling
P.T. Mantrust (Jakarta)	Fruit juices
P.T. Guinness Indonesia (Jakarta)	Wines, spirits
National Brewery (Medan)	Wines, spirits
Pinda Asen Pabuaran (Surabaya)	Liquor

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

poration (Jakarta), 60 million bottles; and P.T. Sinar National Bottling Industry (Jakarta), 48 million bottles.

Canned fruit juices have not been accepted as widely among the Indonesians as have bottled juices and soft drinks, and are sold primarily to the western community. The high cost of canned products and local preference for sweet drinks are the major reasons for low sales volume. Several attempts at domestic production of fruit juices have met with problems due to the quality of many varieties of locally grown fruits. In 1976, several foreign juice manufacturers were investigating arrangements in Indonesia which would include a combination of local production, domestic reconstitution and canning of condensed bases, and limited import of finished products.

Indonesia has two major brewers. P.T. Perusahaan Bir Indonesia, a joint venture between the Indonesian Government and Heineken International N.V. of Amsterdam, operates breweries in Surabaya and Jakarta and produces three million bottles of beer per month, distributed nationally.

P.T. Delta Djakarta, Jakarta, is a joint venture with Heinrich Borst of the Netherlands. The automated brewery has an output of 2,500,000 bottles of Anker Bir a month, accounting for 45% of the total market. All beer is bottled. Equipment includes a Camco (United States) bottle filler, a Barry-Wehmiller (United States) bottle washer, an Anzinger (Germany) pasteurizer, and Roth Tandem (United States) and Yagrenberg (Germany) labelers.

Fisheries, Fish, and Seafood Processing

The total production of the fishing industry was 1.4 million tons in 1975. This 15% increase over 1969 (see table 9) represents just 17% of the potential annual catch (see table 10). Over the same period, exports rose from \$2 million to \$85 million as prices on world markets increased and major fishing activity shifted to prawns (see table 11). The fishing

Table 9.—Indonesia: Fish and Other Fisheries Production
(in thousands of tons)

Year	Sea Fish	Other Resources	Production Total	Exported
1968	723	437	1,159	20
1969	785	429	1,274	21
1970	808	421	1,229	19
1971	820	424	1,244	29
1972	838	429	1,267	36
1973	871	437	1,308	45
1974	906	446	1,352	56
1975	942	456	1,398	70
1976	980	467	1,447	86
1980	1,114	515	1,629	174

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

Table 10.—Indonesia: Potential yearly fish production
(in thousands of tons)

Type	Sea	Brackish Water and Swamps	Fresh Water	Total
Shrimp	125	82	—	207
Tuna/skipjack	200	—	—	200
Marine pelagic fish ...	4,000	—	—	4,000
Marine demersal fish ..	3,000	—	—	3,000
Milk fish ("bandeng") ..	—	360	—	360
Eels ("sidat")	—	34	—	34
Frog legs	—	65	—	65
Carp	—	270	—	270
Pond fish	—	—	73	73
Ricefield fish	—	—	73	73
Lake/reservoirs	—	—	652	652
River fish	—	—	3	3
Total	7,325	811	801	8,937

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

Table 11.—Indonesia: Fish exports by type and year
(in thousands of U.S. dollars)

Year	Prawns	Fresh Fish	Frog Legs	Aquarian Fish	Other
1968	824	512	—	33	581
1969	978	326	9	20	468
1970	3,680	169	286	34	2,006
1971	13,782	892	384	28	3,067
1972	28,000	430	700	30	3,250
1973	35,000	452	945	32	3,413
1974	43,750	479	1,229	34	3,601
1975	78,154	510	2,768	36	3,810
1976	92,100	546	3,390	39	4,030
1980	147,876	716	5,374	51	4,917

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

industry contributes less than 3% to the national income; however, because of its labor-intensive nature it employs 5% of the labor force, many of whom would not be employable in other fields. Between 1969 and 1975, over \$200 million was invested in the fishing industry, with 35% coming from foreign sources, 17% from private domestic interests, and 48% from the Government.

In 1975, over 40,000 tons of shrimp were exported, 95% to Japan. The tuna catch amounts to 10,000 tons per year, most of which is frozen or smoked and then exported. Sardines account for another 16,000 tons, some of which is canned. In addition, 300,000 tons of fish come from inland fisheries, 79,000 tons from freshwater ponds and rice fields, and 70,000 tons from brackish water farming, which is now the fastest growing part of the fishing industry. These last three segments sell to both export and domestic markets; their products represent a large portion of the total animal protein consumed in Indonesia.

There is a wide divergence in the fishing industry between the 74 large firms, which focus on the export market, and the 300,000 small fisheries, which supply both exporters and local consumers. The major producers (see table 12) say they can sell all the fish they can catch, and that primitive fishing habits and reluctance to change are delaying growth in the sector. The large firms have a combined cold storage

capacity of nearly 10,000 tons, plus on-ship cold storage facilities. Thirteen of these firms have their own fleets and possess more than 140 vessels of 100 gross tons and above and 1,200 in the 25- to 100-ton range. In contrast, most small fisheries use boats, fishing equipment, and methods that have not changed in generations; less than 4% of the boats employed by them are motor powered. Small fisheries play an essential role in the industry, however; over half of the 33,000 tons of shrimp caught in 1974 came from small enterprises, which sold their catches to foreign or domestic investment companies.

In East Kalimantan there are four major mechanized fishing enterprises—one joint venture and three domestic firms. Together they operate 48 trawlers and 6 carriers. In addition, 300 motor trawlers, registered to both corporations and local fishermen, operate in East Kalimantan waters. By 1976, the modernization of small fisheries became apparent—the use of motorboats had increased from 20 to 150 in a 2-year span.

P.T. Pumar Cold (Putera Marine Products) began operations at Tanjung Priok, Jakarta, in 1968. Production, carried out to international health standards, includes 200 tons of shrimp, frog legs, fish, lobsters,

Table 12.—Indonesia: Major Producers in Fisheries and Fish and Seafood Processing

Firm and Location	Production
P.T. Pumar Cold (Putera Marine Products) (Jakarta)	Seafood processing
P.T. Trifood Indonesia (Surabaya)	Seafood processing
P.T. Es Sari Tirta (Medan)	Seafood processing
P.T. Topico, Toyo Fishing Industries Co., Ltd. (West and South Kalimantan Irian Jaya)	Shrimp fishing
P.T. Misaya Mitra (South and East Kalimantan and Surabaya)	Shrimp and other fishing
P.T. Nusantara Fishery (Irian Jaya)	Shrimp, tuna, and other fishing
P.T. West Irian Fishing Industries (Irian Jaya)	Shrimp fishing
P.T. Marine Products Development (iMPD) (Irian Jaya)	Shrimp fishing
P.T. Mina Kartika (Aru Island Maluku) ..	Lobster fishing
P.T. Indonesian Fisheries Corporation (INFICO) (Halmahera Island, Maluku Island)	Skipjack and tuna fishing
P.T. East Indonesian Fishery (Irian Jaya, Arafura Sea and Sorong)	Shrimp fishing
P.T. Fajar Fishery (Irian Jaya, Sorong) ...	Shrimp fishing
P.T. Karya Mina (Pakenbaru, Sumatra) ...	Fishing
P.T. Usaha Mina (Sorong, Irian Jaya) ...	Skipjack, tuna fishing
P.N. Perikani (Aer Tembaga, North Sulawesi)	Tuna fishing
P.T. Perikanan Samodra Besar (Sumatra and East and South Java)	Fishing

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.



Food processing employees are shown working on a small portion of the six tons of shrimp cleaned and packaged daily in this East Java plant.

and scallops monthly. Domestic restaurants and hotels purchase 10% of the output; Japanese companies buy the remainder. Pumar has a Japanese contact freezer with 2.5-ton daily capacity, a freezing room with a 7-ton daily capacity, and two cold storage rooms, each with a 50-ton capacity. It also has a fleet of 17 ships of 25-ton capacity and is awaiting delivery of 2 ships of 60-ton capacity. An experience with an unreliable U.S. importer changed the company's export emphasis to Japanese markets, but Pumar is interested in exploring new U.S. possibilities.

P.T. Trifood Indonesia, Surabaya, was established in 1967 as one of the first foreign investment frozen food plants in Indonesia. Plant capacity is 15 tons. Six tons of shrimp and three tons of frog legs are processed daily. Full production is limited only by the lack of additional shrimp. About 95% of the shrimp are exported to Japan, while 95% of the frog legs are sold to Europe. Trifood is interested in the U.S. market.

Trifood's processing is all done by hand in a clean, efficient plant. Shrimp are sorted, deveined, shelled, and packed into 2-kg trays. The shrimp are then covered with sterile water, quick-frozen into blocks, placed in plastic bags, and packed in cardboard boxes.

Trifood receives its sea products well iced, from the Santoso Trading Company by air shipment. All its seafood is processed within 24 hours after leaving the sea. The firm packs and ships to U.S. Food and Drug Administration (FDA) standards.

P.T. Es Sari Tirta, Medan, is a family business run by seven brothers and sisters. It began in 1971 as an ice plant, expanded into shrimp processing in 1972, and began to export to the United States in 1974. Products destined for U.S. markets are processed in a special line that uses extra washings and ice made from boiled water. In 1976, the company was exporting 350 tons per month of shrimp, frog legs, and lobster—80 tons went to the United States, 20 tons to Germany, 200 tons to Japan, and the remainder to various Asian and European countries.

Sari Tirta's equipment comes from a variety of sources; the majority (including a new 400-ton contact freezer) is from Germany. Approximately 10% of its equipment comes from Japan, and a few items are from France. In addition to freezers, cooling rooms, generators, and the ice plant, which produces 60 metric tons of ice per day (all for use in the plant), P.T. Es Sari Tirta owns 42 boats, which collect the shrimp directly from the fishermen at sea.

Tirta's staff members have received special training in shrimp-processing techniques from the Japanese. In 1976, one of the plant engineers was pursuing related studies in Australia.

In the late 1960's, major growth took place in the commercial fishing industry with the introduction of trawling. During Repelita I, the Government directed considerable attention to the fishing industry as a medium for increasing foreign exchange. Initial difficulties concerning sanitation conditions in the processing plants were resolved, and quality improved. The major firms can now pass U.S. FDA inspections; for example, one firm that had a rejection rate of 90% in the early 1970's now receives 100% U.S. FDA clearance.

During Repelita II, the Government has shifted its attention to the small fisheries, providing them with direct aids such as cooperative cold storage plants, powerboats, and technical assistance in building and upgrading fisheries. The Government has shown an interest in foreign aid and supports foreign investment in the fishing industry. BAPPENAS (The National Planning Board) has prepared a list of recommended projects, available to interested investors, government agencies, and aid associations. In addition, the Government has made credit available for small investment projects and for permanent working capital.

International support of fishing projects has been a major factor in the upgrading of the commercial fishing industry. Through the end of September 1975, the Government had approved 14 foreign investment projects with a planned input of \$38 million. Nine involve shrimp fishing and processing; one, tuna fishing; two, fish collection and cold storage; and two, the production of cultured pearls. For these projects, 103 ships with capacities between 100 and 300 tons are utilized.

The Government also approved 26 domestic investment projects through the third quarter of 1975 for a total investment of \$13.4 million. These projects primarily involve shrimp fishing and processing and development of shrimp and fish ponds. For these projects, 131 fishing boats with capacities between 15 and 100 tons are employed.

In order to achieve Repelita II goals for the industry's growth, training centers have been established for local fishermen to encourage acceptance of modern methods, such as motor-powered boats and on-ship and on-shore ice facilities. The success of this scheme is indicated by the 15% increase in the number of motorboats in 1974 (see table 13). As a result of greater mechanization, the freshwater fish haul enlarged by 2.1%.

P.T. Karya Mina, Pakenbaru, Central Sumatra, has been part of a government-sponsored project financed by an Asian Development Bank (ADB) loan of \$2.5 million. The loan was granted in April 1972 for improvement in trawling and gillnetting. It covers purchasing 100 marine diesel engines, equipment,

Table 13.—Indonesia: Increases in the Fishing Fleet, 1970–74

Year	Motorboats		Sailboats	
	Number	Increase (%)	Number	Increase (%)
1970	6,034	13.44	289,402	5.20
1971	7,176	18.93	277,662	4.06
1972	8,818	22.88	286,463	3.17
1973	9,070	2.86	285,700	.27
1974	10,452	15.20	289,130	1.20

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

and power units for 4 cold storage plants with freezers, 4 refrigerated fish carriers, 100 fire extinguishers, assorted fishing nets, compasses, fish finders, and other auxiliary facilities. This project is geared toward Singapore export markets.

P.T. Usaha Mina, Sorong, Irian Jaya, is also an ADB-financed project. Approval for a \$7.9-million loan was received in December 1974 for the improvement of skipjack tuna fishing. Purchases include diesel engines, power units and equipment for a refrigeration and icemaking complex, two refrigerated fish carriers, assorted fishing equipment, a repair workshop, housing facilities for employees, and consulting services. This project is focused on export markets.

P.N. Perikani, Aer Tembaga, North Sulawesi, is a World Bank Group/International Development Association project financed with a \$3.5-million loan. Perikani is planning to expand its fleet with 30 new skipjack vessels of 30 gross tons each and 600-ton cold storage facility. This project is directed toward improving skipjack tuna fishing, preserving the catch in cold storage, and exporting it in refrigerated carriers to export markets.

P.T. Perikanan Samodra Besar, a government-owned, limited-liability company, operates in the coastal waters of Sumatra and East and South Java. This company received \$1.2 million in 1972 under a Japanese aid program, which offered technical assistance, refrigeration and freezing equipment, and the purchase of 18 large fishing vessels. In 1976 a crew of 30 Indonesians was sent to Japan to receive final training and to bring back the last three ships, each of which had 100-deadweight ton capacity and cold storage facilities.

In addition, several countries, including New Zealand and the United States (though the U.S. Agency for International Development (AID)), have set up small demonstration projects designed to improve the efficiency of small fisheries. The projects advocate both on-ship and on-shore ice facilities to extend fishing times and increase the weight of catch per trip.

A Fisheries Development and Management Project has been jointly undertaken by the Directorate-General of Fisheries and the U.S. Department of Agriculture. It has been providing advisory services in resources assessment, management, fish processing, refrigeration, and marketing and has been assisting in the development of fish landing centers and harbors. The Government has supported the project with \$566,930, while the United Nations Development Plan (UNDP) has already spent \$54,000 of the \$1,230,416 approved for the scheme. In 1975, the project was extended for 18 months to continue the advisory services of a live-bait fishing expert and to add more equipment and vehicles.

Most people live a long way from the primary sources of seafood products. Domestic marketing of fish and seafood products has been difficult because, of inadequate transportation and the imbalance in the population distribution. As a result, a system of middlemen has arisen. These middlemen serve as the inter-insular traders; they buy from the local fishermen and transport the fish to marketing centers in Jakarta, Surabaya, and Cirebon. This arrangement is regarded as disadvantageous to the local fishermen, who receive less than 20% of the market value of the catch.

The Government is attempting to improve the marketing pattern, in order to increase the volume of fresh fish available to the consumer at a fair price and to improve the income share of the local fishermen. The Government has set up cold storage facilities in various production and consumer centers and is establishing a government-owned, limited-liability company at Pekalongan to handle marketing. This company will have cold storage facilities, ice factories, and harbors with landing facilities in various locations on Java, Sumatra, and Kalimantan, as well as ships and trucks equipped with refrigeration systems. Full operation of this project is planned for mid-1977.

Other Food Products

Coffee.—Coffee processing is minimal. Some coffee beans are dried mechanically, but the vast majority are sundried. High-quality coffee beans are exported to Europe for roasting; lower grades are sold to companies in the United States for processing into instant coffee. (See Agro-Industry for coffee production and export figures.)

At least two attempts have been made to produce instant coffee domestically, but both have met with little success because of consumer preferences for fresh ground coffee and the intense price competition from imported brands. One firm, Nestle's, has ceased production, and the other is seriously considering doing the same. However, the Johs Larsen Company of

Norway filed in 1976 a joint-venture application for a \$1.7-million instant coffee processing plant near Jakarta.

Spices.—Indonesia imports, grows, processes, and exports spices. In 1975, a special campaign was begun by the Agricultural Center to advise farmers on ways to increase the volume and quality of spices. A new marketing system, which allows farmers to sell directly to exporters, was also started. As a result of this program the quality of spices was improved, marketing procedures were simplified, and the income of spice farmers rose by as much as 200%.

The Indonesian subsidiary of International Flavors and Fragrances Inc. (U.S.) P.T. Essence Indonesia, Jakarta, makes food flavoring compounds which are sold to spice companies for use in various spice mixtures. All IFF's raw materials are purchased abroad, but packaging is manufactured locally. The plant equipment includes Gulin (United Kingdom) homogenizing equipment. Hafeo (Germany) distillation equipment, blending tanks from the Netherlands, and various size mill presses from the United Kingdom, the Netherlands, Germany, the United States, and Australia.

P.T. Mantrust, Jakarta, and others have begun processing spices and flavorings, such as ginger, nutmeg, cloves, and banana extract, and hope to expand their selection of spices for domestic markets. Exports are a possibility for the future.

P.T. Tambuo, Bandung, produces spices, including cloves, ginger, and others, for domestic markets. The company also produces a variety of soup bases.

Pasta.—Noodles and macaroni form a significant part of the Indonesian diet. Hundreds of small and medium-size manufacturers of pasta supply markets and local stores. Some of the large food companies, such as Mantrust, produce pasta in addition to other food lines.

Small firms do their mixing and cutting by hand, and air-dry the noodles. A few of the large firms use cutting and drying equipment from Italy and Taiwan.

The increased availability of flour from the Bogasari expansion program should enable enterprises engaged in pasta manufacture to expand.

Snack Foods.—Sales of snack foods, such as krupuk (shrimp chips), peanuts, rice chips, and banana chips, have been increasing rapidly. Most of these items have traditionally been part of the Indonesian diet and are still produced at the cottage industry level. However, companies are beginning to mass-produce these items and not only are increasing domestic sales but also are moving into export markets.

Cigarettes.—Cigarette production in Indonesia is estimated to be 63 billion per year; another 2 billion

are imported. Sales increased only 1% per year over the last 5 years, and that growth rate is not expected to increase over the next 5 years. Long-range projections indicated growth by the 1980's in view of the large population of young people and the expected rise in disposable income by 1985. Cigarette manufacturers encourage brand changes by present smokers and compete by offering a variety of incentives, such as glasses and other gifts.

Three types of cigarettes are produced in Indonesia. "Kretek," the famous clove cigarettes, account for 50% of the total market. Approximately 33.9 billion kretek cigarettes are produced each year by 250 manufacturers. Much of the operation, from rolling through packaging, is done by hand and is highly labor-intensive (see table 15). However, one large plant is considering automation. In some very small operations, cigarettes are rolled by people in their homes and are collected daily for hand packaging.

Two companies, P.T. Meru Buana and P.T. Mega, both of Jakarta, have exclusive responsibility for importing and distributing cloves. All cloves, both domestically produced and imported, must be sold to these firms, who in turn distribute most of this commodity to the kretek cigarette manufacturers in amounts proportionate to the value on the excise tax stickers purchased by each company.

Domestic manufacturers of white cigarettes are located primarily in North Sumatra and account for 25% of the total cigarette market. Their production amounts to 14.4 billion cigarettes per year. The five leading Sumatran brands are:

<i>Brand</i>	<i>Plant Location</i>
Pagi	Tebing Tinggi
Sumatra Tob Coy	Pematang Siantar
Kisaran	Kisaran
Senat	Pematang Siantar
Others	North Sumatra

International manufacturers of white cigarettes produced in Indonesia account for 25% of the total market for cigarettes. The five producers are:

<i>Company</i>	<i>Location</i>
Philip Morris	Malang
British American Tobacco .	Cirebong Semarang
Faroka	Malang
R. J. Reynolds	Jakarta
Asia International	Jakarta

Prices of both tobacco and cigarettes are indirectly controlled by the Government in that manufacturers can neither purchase tobacco directly from the growers nor sell directly to agents and distributors. Authorized dealers purchase all tobacco for resale to the cigarette manufacturers, and these manufacturers must then sell all of their output to five Indonesian-owned distribution companies. Theoretically, the

cigarette manufacturers set their own prices; in practice, the Government sets the limits.

There are 74 firms involved in the manufacture of other tobacco products. These firms produce cigars and pipe, cut, and chewing tobacco, both for domestic use and for export. Most operations are still heavily labor-intensive.

Ice Plants.—Though ice plants have increased in both number and production in the last 5 years, output falls far short of industrial and consumer needs. In 1974, there were 273 ice plants in operation, with production capacities ranging from 3 to 1,200 tons per day—the majority in the 100- to 300-ton range (see table 14 for major plants). Much of the ice goes for direct consumer use in hotels and restaurants, leaving industrial requirements seriously undersupplied. For example, in 1973 the minimum needs for the fishing industry alone exceeded 1 million tons, with an optimum of 1.7 million tons. Total ice production that year was only 223,000 tons. Estimates show that the fishing industry has a minimum

Table 14.—Indonesia: Cold Storage and Ice Plant Facilities

Firm	Location	Capacity
P.T. Perikanan Samudra Besar	Sabang (Aceh)	300 ton
P.T. Surya Aceh	Lhok Seumawe (Aceh)	200 ton
P.T. Y. Surya Sakti	Belawan (North Sumatra)	200 ton
P.T. Es Sari Tirta	Medan (North Sumatra)	200 ton
P.T. Indra Deli	Medan (North Sumatra)	400 ton
P.T. Timur Jaya	Balai Asahan (North Sumatra)	200 ton
C.V. Sisco	Padang (West Sumatra)	10 ton
P.T. Nicibo	Sibolga (West Sumatra)	6 ton
P.T. Kara Mina Unit I	Tg Pinang/Tg Unggat (Riau)	50 ton
P.T. Kara Mina Unit III	Sci Buluh (Riau)	50 ton
P.T. Kara Mina Unit IV	Pinang	100 ton
P.T. Dharma Niaga	Ulu Laut (South Sumatra)	30 ton
P.T. Sufroco	Palembang (South Sumatra)	60 ton
P.T. New Pioneer	Ilir, Plb. (South Sumatra)	250 ton
P.T. Tofico	Jakarta (DKI)	50 ton
P.T. Pumar	Jakarta (DKI)	200 ton
P.T. Dharma Mulia	Jakarta (DKI)	200 ton
P.N. Perikani Barat	Jakarta (DKI)	250 ton
P.T. New Pioneer	Jakarta (DKI)	200 ton
P.T. Delphi Samira	Jakarta (DKI)	100 ton
P.T. Wirontono Coldstorage	Jakarta (DKI)	1,200 ton
P.T. Semarang Coldstorage	Semarang (Central Java)	620 ton
P.T. Cejamp	Semarang (Central Java)	500 ton
P.T. Tirta Raya Mina	Pekalongan (Central Java)	100 ton
P.T. Central Java Coldstorage	Cilacap (Central Java)	100 ton
P.T. Surabaya Marine Product	Surabaya (East Java)	100 ton
P.T. Trifood Indonesia	Sidoarjo (East Java)	300 ton

Table 14.—Indonesia: Cold Storage and Ice Plant Facilities—Continued

Firm	Location	Capacity
P.T. Sekarbumi	Waru Surabaya (East Java)	100 ton
P.T. Nafo (Mantrust)	Banyuwangi (East Java)	15 ton/hr
I S C O	Banyuwangi (East Java)	8 ton/hr
P.T. Pindamamin	Surabaya (East Java)	50 ton
P.T. Ksatria Bhakti	Surabaya (East Java)	20 ton
Banyuwangi Canning Co.	Banyuwangi (East Java)	2 ton/hr
N.V. Munchar	Muncar (East Java)	4 ton/hr
C.V. Sumber Jaya	Muncar (East Java)	15 ton/hr
P.T. Blambangan Raya	Muncar (East Java)	40 ton/hr
P.T. Harapan Lancar	Muncar (East Java)	2 ton/hr
U.D. Sumber Jala	Muncar (East Java)	2 ton/hr
U.D. Munchar Jaya	Muncar (East Java)	15 ton/hr
P.T. Nafo Mantrust	Muncar (East Java)	10 ton/hr
P.T. Perikanan Samudra Besar Bali	Bali (East Java)	900 ton
P.T. Mina Kartika	Saranamual (Maluku)	100 ton
P.T. Nusantara Fishery	Ambon (Maluku)	100 ton
P.T. East Indonesian Fishery	Ternate (Maluku)	100 ton
P.T. IMPD	Sorong (Irian Jaya)	100 ton
West Irian Fishing Industry	Sorong (Irian Jaya)	100 ton
P.T. Alfa Kurnia Fish Enterprise	Sorong (Irian Jaya)	100 ton
P.N. Perikani Aertembaga	Bitung (North Sulawesi)	600 ton
P.T. Hasikin Jaya	Bitung (North Sulawesi)	50 ton
C.V. Corimex	Upg (South Sulawesi)	100 ton
P.T. Bonecom	Ujungpandang (South Sulawesi)	100 ton
P.T. Serdid	Upg (South Sulawesi)	50 ton
P.T. Tridaya Kartika	Upg (South Sulawesi)	140 ton
P.T. Misaya Mitra	Samrinda (East Kalimantan)	50 ton
P.T. Misaya Mitra	Kotabaru (South Kalimantan)	420 ton
P.T. Kalimantan Fishery	Banjarmasin (South Kalimantan)	100 ton
C.V. Dharma Mulia	Pontianak (West Kalimantan)	170 ton
P.T. New Pioneer	Pontianak (West Kalimantan)	60 ton

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

loss of 30% because of lack of proper refrigeration. The Government, foreign and domestic investors, and international aid programs have instituted projects to increase ice production in an attempt to fill industrial needs. (Also see Fisheries, Fish, and Seafood Processing.)

Packaging

Packaging is a rapidly growing industry in answer to food industry requirements and other industrial needs of the country. Most modern food processing firms have complete packaging facilities to meet their production requirements. (See table 15).

Fifty-six firms produce metal containers and have a total of 2,993 employees. Cardboard containers are

Table 15.—Indonesia: Major Food Packaging Enterprises

Firm and Location	Production
P.T. Guru (Jakarta)	Paper boxes
P.T. Glassari (Bandung)	Glass containers
Corning-Owens (Jakarta)	Glass containers
P.T. Kangar Consolidated Industries (Jakarta)	Glass bottles and containers
P.T. Kedaung Subur (Surabaya) .	Glass bottles and containers
P.N. Iglas (Surabaya)	Glass bottles and containers
P.T. Crown Cork and Seal Indonesia (Jakarta)	Corks and bottle caps
P.T. United Can Company Ltd. (Jakarta)	Cans
P.T. Puper (Putera Paper Products Corporation Ltd.) (Jakarta) ...	Corrugated cardboard boxes, plastic strapping band, paper tubes
P.T. Putera Toppan	Gravure printing and Flexo packaging
P.T. Kertas Bakasi Teguh (Bakasi)	Production of basic materials for corrugated cardboard boxes and paper
P.T. Mantrust (Jakarta)	Cans

Source: Departments of Industry and Health, Central Bureau of Statistics, and industry sources.

made by 19 firms, which employ 974 people. Increased demand for such containers led to a 58% rise in employment in these firms in 1 year. Glass and glass products are manufactured by 56 companies employing a total of 4,989 workers. The glass products category includes dishes, medicine, and cosmetics bottles, as well as food containers. Production within the industry varies from modern automated factories to can shops that are little more than garages where containers are formed and assembled totally by hand.

P.T. United Can Company, Ltd., Jakarta, specializes in cans and produces 3 million per month, accounting for 60% of the market. The company has a Meltog (United Kingdom) bodymaker, and power presses from John Hine (Australia) and Poyo Seikan (Japan) to produce the tops and bottoms.

P.T. Food Specialties Indonesia, Surabaya, has three modern can lines, which produce different size containers. The machines are run alternately to match canning production to milk-processing needs. The bodymaker is purchased from Meltog (United Kingdom), the lid machines are bought from Switzerland, and the cutters are imported from Italy. Tin is imported and then printed in Surabaya. Labels are printed in Surabaya, and boxes are made in both Surabaya and Jakarta.

P.T. Pabrik Coklat Cendrawasih, Surabaya, produces all the cans necessary for its chocolate business. The company's canmaking equipment, which came from the Netherlands in 1938, usually sits idle while men with handtools produce 400 large, 500 medium, and 600 to 1,000 small cans per day. The

tin is imported from Japan, and labels are produced and printed locally.

P.T. Mantrust, Jakarta, has three lines, which make 60,000 cans per hour. The firm produces sufficient quantities to satisfy not only its own needs but also those of several other companies.

Growth in cardboard container manufacture is exemplified by the success of various members of the Putera Group. One of the youngest business groups in Indonesia, it has enlarged to meet the needs of expanding Indonesian markets. Putera headquartered in Jakarta, comprises six firms: three involved in printing and packaging, one in food processing, one in import-export, and one (still under construction) in producing tiles and bricks. Present employment is 1,200; an additional 400 will be hired when the two newest plants are in operation. One key to the success of this group has been the attention given to training young management and to increasing the ability and efficiency of its employees.

The parent firm, P.T. Putera Adil Utama, established in 1963 as Fa. Putera Adil, is an import-export trading company, which handles a wide range of industrial equipment and commodities. In 1968, P.T. Pumar Cold (Putera Marine Products) was established and began operation of a modern seafood processing plant at Tanjung Priok, Jakarta. (Also see Fisheries, Fish, and Seafood Processing.)

P.T. Puper (Putera Paper Products Corporation Ltd.), Jakarta, was founded in 1969 in response to rising needs for quality packaging materials. The plant produces several types of corrugated cardboard boxes, plastic strapping band, paper tubes, toilet paper, and facial tissue. The plant has been operating its Ucaida (Japan) boxmaking equipment to capacity. So in 1976 it purchased a new Peters (Germany) corrugating machine to increase production.

In 1973, the opening of P.T. Putera Toppan, a joint venture with the Japanese Toppan group, added gravure printing and Flexo packaging to the Putera Group's capabilities.

In 1976, P.T. Kertas Bekasi Teguh opened a new factory in Bekasi for the production of basic materials for corrugated cardboard boxes and paper. The plant has a production capacity of 1,000 tons of Kraft line board per month.

Bottle production more than tripled between 1970 and 1973, rising from 10,897 tons to 37,239 tons. This growth was due primarily to the entry of international companies such as Coca-Cola into the beverage industry.

Glass bottle production will continue to be directly linked to growth of the food and beverage industry, inasmuch as all beverage bottles in Indonesia are required to be reusable. The major competition for

glass containers will come from the increasing production of plastic goods. Three sizable firms dominate bottle and food container manufacturing.

P.N. Iglas, Surabaya, the State-owned company, is Indonesia's largest manufacturer of beverage bottles, medicine containers, and other glassware. Initially, capacity was 24,000 tons per year, but in the early 1970's, in cooperation with Australia Consolidated Industries, capacity was increased to 40,000 tons per year.

P.T. Kangar Consolidated Industries, Jakarta, is a joint venture with Australia Consolidated Industries (Australia), Owen Illinois (United States), and Private Investment Company of Asia. Production capacity is 14,000 tons of bottles and glassware per year.

P.T. Kedaung Subur, Surabaya, a domestic investment project, is a sister company of P.T. Kangar Consolidated Industries. Production is 394,200 gross of glassware and 146,000 gross of bottles per year, for a total of 20,000 tons.

In cooperation with the Indonesian Government, a Packaging Center is being established in Jakarta. This project, supported by \$400,000 in UNDP funds, is intended to improve the quality of manufactured packaging materials and containers and to modernize packing techniques for industrywide needs, and to use all Indonesian resources in the packaging field. The Packaging Center will include a testing laboratory for materials and methods, assistance in the development of packaging machinery and equipment, development of new applications for locally available packaging materials, and experimentation with new methods and styles of packaging. The schedule calls for a consultant to spend 4 months working with the Indonesian Government to define the administrative and physical requirements for the center, and to submit a detailed report describing the technical assistance and equipment needs of the project.

Principal Government Offices

The Government influences development of industry through licensing and granting incentives to investors, as well as carrying out a number of programs and projects in animal husbandry, agriculture, fisheries, marketing, and distribution. In order to protect domestic entrepreneurs, wholly owned foreign investments are prohibited in a number of areas in food processing and packaging including: milk and dairy products, monosodium glutamate, cigarettes, coconut oil, flour milling, biscuits and confectionery, soft drinks and beverages, ice cubes, noodles, and can making. The Government has initiated programs to improve quality control, health inspection, and product standardization. The following departments have

responsibility within the food processing and packaging industry:

Directorate of Food and Drink Industry, Ministry of Industry, (Jl. Kebon Binatang III, No. 8, Jakarta)

Directorate of Food and Drink Control, Ministry of Health, (Jl. Prapatan 10, Jakarta)

Department of Agriculture Directorates General for Annual Husbandry and Fisheries (Jl. Lt. Jen. S. Parmen 73, Cikoko)

Director for Standardization, Normalization, Quality Control Department of Trade (Jl. Abdul Muis 87, Jakarta)

The following educational institutions offer courses in food technology:

Institut Pertanian Bogor (I.P.B., Institute of Agriculture, Bogor.)

Balai Penelitian Kimis (Chemical Research Institute, Bogor)

Institute of Technology, Bandung

University of Pajajaran, Bandung

University of Gajah Mada, Jogjakarta

Academi Gula Negara (State Sugar Institute, Jogjakarta)

Balai Penelitian Industri (Institute of Technical Research, Jakarta)

Lembaga Hortikulture (Horticulture Institute, Pasaringgu)

University of Makassar, Sulawesi

Nutrition Academy, Jakarta

Institute of Technology, Surabaya

INDUSTRY TRENDS, PROGRAMS, AND PROJECTS

Since Indonesia has a steadily increasing population, the main focus of the country's food industry has been on feeding people in the simplest, most nutritious, and most economical way. Although considerable funds and energy have been expended on agro-industry, a 1968 United Nations study of food processing in Indonesia and a similar study by the United States Government in 1970 describe an industry very much like the one that exists today. Great improvements have been made in sanitation levels and in the technology used by the major producers in certain segments, such as dairy products and fishing, but in many factories, equipment brought from the Netherlands over 40 years ago is still in operation.

Two changes in Indonesian society have been responsible for growing interest in the food processing industry. First, the large petroleum-drilling firms and other major foreign investors have brought large quantities of processed foods to their project sites. Intended primarily for the European staff, this food has introduced Indonesian workers to European cuisine and to the concept of processed foods. The second change has been the growth of international business and tourism, which has given rise to hotels and catering services. Assured supply and quality control are essential to these operations, and processed foods are the logical solution.

Raising the level of nutrition has been one of the Government's primary aims during the first and second national development plans. During the first plan attention was centered on providing sufficient quantities to feed the population; in the second plan more concern is being given to the quality of the diet. Educational programs to encourage crop diversification are being conducted for farmers; programs to provide an understanding of the necessity of a varied and balanced diet are held for local people.

Rice has been the area of major emphasis for the Government under Repelita I and Repelita II; however, rice production has not kept up with an annual population increase of approximately 2.5% and increases in per capita consumption. In 1975, floods and attacks by insects and rats caused rice production to decrease .7% below the 1974 level and fall 1.9% below the Repelita II goals for 1975. The 1976 crop was predicted to increase because of additional irrigation and intensified planting measures. In an attempt to keep rice supplies in line with the population increases, the Government has instituted a program to rehabilitate and expand old mills and to build new ones. Although projections call for self-sufficiency in rice production by the end of Repelita II, some industry sources believe this goal to be impossible because of increased consumption and the tendency of farmers to convert rice land into other cash crops.

The Government has also focused on strengthening the fishing sector's capabilities for export and for the provision of more protein in the Indonesian diet. The first plan aimed at improving the commercial fishing industry, and the second plan concentrates on helping the local fishermen.

Government programs have also supported the development of wheat and sugar mills and the various food oil refineries. Local processing has also been bolstered by the Government's policy of increasing the import tariffs on processed foods.

Sanitation requirements have been regulated, and enforcement procedures implemented. The primary focus was formerly on products for export, but domestic production is now being more closely supervised; there is thus a noticeable improvement in quality and a significant reduction in rejection rates. For example, between 1969 and 1974 the rejection rate dropped 32% for coffee plants, 97% for pepper factories, and 48% for shrimp processing works. Many modern seafood plants now receive 100% approvals. However, the number of inspectors is inadequate for the task, and many small operations still leave much to be desired in the way of cleanliness.

Fishing, milling, and dairy operations have attracted considerable foreign monetary input in the form of investments and aid programs. Japanese in-

vestment is heavy in all parts of the fishing industry, from boats to processing plants. Asian Development Bank, U.S. AID, World Bank, and various European governments have made funds available through loans and grants.

Major investments in the other segments have been primarily through domestic/foreign joint ventures—usually the foreign partner supplies technical and administrative assistance, equipment, and capital. The Government has supported these ventures as well as moves toward localizing intermediate processing and will probably continue to encourage such undertakings, to increase foreign exchange dollars, and to raise nutritional levels.²

Between 1967 and 1974, approvals were granted to 35 foreign investment projects valued at \$79.5 million. In 1975 and the first quarter of 1976, applications were filed for 12 foreign investment projects totaling \$38,891,800; also filed in that period were 42 domestic investment applications worth \$92,300,000.

GROWTH EVALUATION

The consensus in the food processing industry is that growth is a certainty. Consumers are increasingly interested in processed foods, and acceptance of these products grows with expanding urbanization and the rise of a middle class. The groundwork for expansion will be laid between 1976 and 1978, and rapid growth will begin in 1978.

Repelita II calls for a 10.4% growth in the food industry; attention focuses on agriculture and on primary processing, such as rice milling, oil processing, and fishing operations. It is difficult to estimate growth for the more technical segments, such as canning, baking, and dairy processing, but 5% is the most commonly cited projection.

Lack of refrigeration and distribution systems has hampered growth enormously in the past. The use of electricity and the construction of highways will facilitate transport not only of finished products to consumers, but also crops to processors.

The small size of present land holdings creates difficulties in obtaining the quantity and uniformity of crops necessary for mechanized food processing operations. Private industries, supported by the Government, are seeking to develop cooperative farming arrangements to overcome this problem.

Limited technical knowledge and limited managerial skills initially limit both the types of industries and the rate of expansion. Some processors have had

² Although foreign investments have been prohibited in a number of areas within the food processing industry good proposals may still be considered, particularly if they are for joint ventures with existing domestic firms.

trouble in finding people to operate highly technical equipment and in maintaining consistent quality. Some firms have trained their own workers and have found them able and willing to learn. For these companies, the only apparent problem was the temporary postponement of full-capacity production during the training period.

Limited capital restricts growth and necessitates selectivity in equipment purchases. Producers must carefully choose the types of equipment to process foods having the largest consumer potential. Several firms mentioned an interest in foreign partnership arrangements in order to acquire technical and managerial expertise and additional capital.

Smuggling of imported processed foods has provided serious competition to domestic production. Goods purchased in Singapore and entering Indonesia illegally can often be sold at lower prices than domestic items. The 1976 crackdown on smuggling has had major effects, as demonstrated by the shipping records of a company known to carry large amounts of foodstuffs from Europe. In 1975, the firm brought 20,000 tons per month into Singapore; 1 year later its monthly total was 12,000 tons. That reduction is believed to be the result of the clamp-down on the reshipping of items to Indonesia.

At a 1975 Australian processed food show, all 55 exhibitors made arrangements with Indonesian agents. The four-member U.S. processed food team that visited the country in 1976 made \$200,000 in sales and in 2 days wrote \$750,000 in orders. The U.S. Processed Food Exhibition, held in Singapore in 1976, also attracted a good deal of Indonesian interest; several of the firms were looking for agents in Indonesia and were also investigating production possibilities. As the agricultural sector becomes more secure in the basic task of feeding the population, interest in the sort of varied diet available from processed foods will increase. Recent developments and continued expansion in the packaging industry will also facilitate growth in the food processing industry.

MARKET SIZE

In 1975 the total market for food processing and packaging equipment in Indonesia was an estimated \$42.5 million (see table 16). Between 1973 and 1975, construction of several large projects, including the Bogasari second unit, caused rapid growth in sales—from 1973 to 1974 sales expanded by 73% and in 1975 the market rose by 21%. Based on import-export data, purchase and expansion plans, and discussions with industry sources, a market approaching \$82 million in 1980 is projected.

Of 1975 sales of \$242.5 million, \$16.3 million were for food freezing and refrigeration equipment,

Table 16.—Indonesia: Size of Market for Food Processing and Packaging Equipment

	1973	1974	1975	1976	1980
FOOD PROCESSING EQUIPMENT					
Domestic Production	300	400	450	500	700
Imports					
United States	230	490	840	680	1,200
Japan	1,970	2,200	2,900	—	—
United Kingdom	1,620	2,980	3,640	—	—
West Germany	1,010	1,330	1,820	—	—
Italy	200	1,430	1,200	—	—
Belgium/Luxembourg ..	—	1,260	980	—	—
Others	1,200	1,800	2,620	—	—
TOTAL	6,230	11,490	14,000	15,000	29,200
TOTAL MARKET ..	6,530	11,890	14,450	15,500	29,900
GRAIN MILLING EQUIPMENT					
Domestic Production	200	300	400	400	500
Imports					
United States	10	—	—	20	200
Japan	1,117	1,900	1,400	—	—
Italy	112	1,430	1,800	—	—
West Germany	204	290	350	—	—
United Kingdom	42	100	150	—	—
Switzerland	111	10	50	—	—
Other	425	600	700	—	—
TOTAL	2,021	4,330	4,450	4,820	5,120
TOTAL MARKET ..	2,221	4,630	4,850	5,220	5,620
FOOD FREEZING AND REFRIGERATION EQUIPMENT					
Domestic Production	Nil	Nil	Nil	Nil	Nil
Imports					
United States	3,280	5,410	6,300	6,650	7,100
Japan	1,450	3,960	5,500	—	—
Netherlands	600	1,230	1,600	—	—
West Germany	630	1,160	1,500	—	—
Denmark	360	500	780	—	—
United Kingdom	30	120	300	—	—
Others	250	130	320	—	—
TOTAL	6,600	12,510	16,300	19,680	35,560
TOTAL MARKET ..	6,600	12,510	16,300	19,680	35,560
FOOD PACKAGING EQUIPMENT					
Domestic Production	Nil	Nil	Nil	Nil	Nil
Imports					
United States	830	350	400	480	670
West Germany	1,250	2,050	2,230	—	—
Japan	1,010	2,270	2,500	—	—
Italy	310	350	500	—	—
Netherlands	270	390	400	—	—
United Kingdom	200	310	350	—	—
Other	1,100	440	470	—	—
TOTAL	4,970	6,160	6,850	7,820	10,900
TOTAL MARKET ..	4,970	6,160	6,850	7,820	10,900
SIZE	20,321	35,190	42,450	48,220	81,980

Source: Official Indonesian and supplier statistics, and estimates based on trade source interviews.

\$14.5 million for food processing equipment, \$6.9 million for food packaging equipment, and \$4.8 million for grain milling equipment. Food freezing and refrigeration equipment purchases are expected to reach \$35.6 million in 1980, representing an increase of 118%. More available electric power and heightened consumer preference for fresh or freshly preserved food will be the main factors responsible for this growth. Development of the transportation infrastructure will stimulate sales of mobile refrigeration units. The fastest growing market, food process-

ing equipment, will increase by 333% and reach \$29.9 million by 1980. Several large processing plants planned for startup toward the end of Repelita II will account for the bulk of this spending. Food packaging equipment is expected to grow 57% to \$10.9 million in 1980. The bulk of these sales will consist of medium-size and small units. Sales of packaging equipment will intensify, especially after 1980, as many companies leave packaging as the last step in automation. A major exception will be fill-and-seal types of equipment for which the packaging is an essential part of the processing. Sales of grain milling equipment probably peaked with the construction of the Bogasari second unit and are predicted to increase only 16% to \$5.6 billion in 1980.

Imports

In 1975, suppliers from the United Kingdom, with 26% of the market, were the leading sellers of food processing equipment and are expected to hold this advantage in 1980. Project financing with equipment purchase clauses has accounted for several large sales. Japanese manufacturers utilized low prices and generous credit arrangements to gain 21% of the market. The market shares of German and Italian suppliers were 18% and 9%, respectively. Sales of equipment from U.S. manufacturers comprised only 6% of the market, primarily because of inactivity on the part of American firms.

German and Japanese suppliers of food packaging equipment were the market leaders in 1975. German sales were based on quality and availability of technical assistance; the main selling point among Japanese manufacturers was low price. It is expected that sales of Japanese equipment will increase by 1980 to comprise nearly 40% of the market.

U.S. and Japanese manufacturers led in sales of food freezing and refrigeration equipment in 1975, accounting for 39% and 34%, respectively. Equipment from the United States is recognized for its quality, dependability, and variety of sizes and special-use items. Japanese firms often offer finished-product purchase guarantees as buyer incentives. For example, several Japanese firms guarantee purchase of frozen shrimp in exchange for equipment purchases. Japanese suppliers are predicted to gain a wide margin over American manufacturers, acquiring 60% of sales in 1980. Low prices and liberal financing arrangements will become increasingly important as smaller firms begin to purchase freezing and refrigeration equipment.

Italian manufacturers led in sales of grain milling equipment in 1975 because of the large purchases required for the Bogasari Mill expansion. Japanese suppliers led in the sale of rice milling equipment and gained 32% of the market. Completion of the major

wheat milling projects will cut sales from Italian firms, and trade sources predict Japanese suppliers will acquire a 39% market share by 1980. U.S. equipment manufacturers have not made significant sales in this field.

Domestic Manufacturing

Domestic production of food processing equipment is confined to general-purpose items such as simple sterilizers, mixers, basic baking pans, metal vats, and some basic oil and rice milling equipment. Two large government-owned firms in Surabaya, P.T. Barata Metalworks and Engineering Ltd. and P.T. Boma Bisma Indra, supply food processing equipment on a special-order basis. Smaller local metal workshops have also shown great ingenuity in fabricating basic vats, pans, wheeled carts, and spare parts.

MARKET OPPORTUNITIES

Indonesia is a potential market for every type of equipment related to food processing—from out-board motors for small fishing boats to plastic-packaging machines. The immediate emphasis is on easily operated, low-cost items for streamlining operations and augmenting sanitation. Because of the state of development and the need for modernization in the industry, the tendency is to purchase complete lines rather than single pieces of equipment. Cost factors necessitate long-range expansion plans designed for implementation in stages, such as the immediate purchase of a basic line with optional additions spaced over the following years.

Fields of primary interest over the next 2 years are discussed below.

Freezing and Refrigeration Equipment.—Freezing and refrigeration equipment is an absolute essential to continued growth in the processing field; sales will follow the spread of electricity. Emphasis will be on the very large items, such as contact freezers for meat and seafood processing plants, and on the very small items like ice cream chests for local stores. Mobile refrigeration units of various sizes are expected to attract increasing interest as the transportation system develops.

In addition, the Government is encouraging small fisheries to use on-shore and marine cold storage facilities. Two sample projects, one by U.S. AID, have been set up to demonstrate the bounteous fishing catches from boats equipped with ice facilities, which allow them to stay out and fish longer. If the results of these experiments are conclusive, sales of marine-related refrigeration and icemaking equipment will increase. It was reported that there may be

potential for sales of nitrogen tankers for use in refrigerating meats, vegetables, and other perishables. The Aneka Gas Industri factories presently dispose of nitrogen resulting from oxygen-production processes.

Baking Equipment.—Consumer interest in bakery products has increased steadily in the past decade, and the opening of the second Bogasari Mill should provide adequate supplies for bakery expansion. Bakers are interested in expanding both quantity and variety of products; they have demonstrated an openness to advice and technical assistance. All types of equipment are needed—mixers, rollers, shapers, pans, carts, and ovens, even continuous-process systems. Quantity-control items, such as roll and breadmaking and measuring machines, are in demand. The market for specialty items, such as pastry-rolling and filling equipment and doughnut machines, is also steadily increasing. Single-portion items are expected to claim a major part of bakery sales for the next few years. Low-cost packaging that maintains freshness during delayed deliveries also will interest bakers.

Testing Equipment.—Sales potential exists in all segments of the food industry for testing and control equipment—both on-line and laboratory devices. Quality control is of primary interest. As firms consider major capital expenditures, however, profit per unit and quantity tolerance control become more important. The law presently allows bakeries +10% tolerances, but customer satisfaction requires maintaining the advertised size as the minimum. Furthermore, the profit loss involved in a 10% overage is cause for some bakeries to investigate equipment that will standardize output to close tolerances.

Suack Foods and Candy-making Equipment.—The cultural interest in “finger-foods” and sweets makes snack foods and candy a field with strong sales possibilities. Past experience has shown that even a slight increase in per capita income results in immediate sales of snack-type foods that can be purchased for just a few rupiahs. Potential exists for sales of chip slicers; cutting, slicing, and baking equipment; and candy cookers and mixers. Interest has been expressed in complete equipment lines for standard goods, such as candy bars, and for novelty items, such as chocolate products and hard candies. Mixers, trays, wheeled carts, and temperature control and cooling equipment also offer sales possibilities.

Packaging.—Packaging probably has the greatest potential and is the key to opening up other segments of Indonesia’s food processing industry. In a country where sanitation, refrigeration, and transportation are limited, preservation and protection of food products are high priorities. Plastic packaging, a relatively new field, offers good potential for its low cost and its ability to maintain quality and freshness. In-

terest is growing in fill-and-seal packs, considered the ideal method for packaging meats, vegetables, fruits, dairy products, and beverages. The emphasis is on individual or small portions. Sales possibilities exist for vacuum form-fill-seal systems, thermoformers, heat sealers, and liquid and dry fillers of various types.

Air Conditioning and Climate Central Equipment.—The necessity for upgrading sanitary conditions is stimulating interest in air conditioning and climate control equipment, especially when the equipment can be shown to increase production efficiency. Growth of such sales will be significantly influenced by the availability and cost of electrical power, either through the State power utility or through autogeneration.

Additional Opportunities.—Other sales possibilities include processing equipment for baby foods, frozen meat, fruit, and vegetables, as well as fishing equipment, including small boats.

Small turnkey processing plants offer a solution for outlying areas in that cooperatives can process their own crops, thus avoiding losses on the way to factories and markets. Both government and international aid funds could be available for this type of project. Future development of totally integrated projects, including food production, processing, distribution, marketing, and management expertise, is also feasible.

Several U.S. food processors are considering the sale of secondhand equipment in Indonesia. Labor costs are a major factor in America, and many U.S. machines are technologically sound but could be replaced with later, less labor-intensive models. The practice of selling older U.S. models of processing equipment in Indonesia would encourage faster expansion by allowing producers to obtain high-quality equipment with a relatively small capital outlay.

IMPORT PROCUREMENT

Buyers Universe

There are five equipment purchasing groups within the food processing sector: government operations, foreign investments, foreign-domestic joint ventures, private ownerships, and international aid projects.

The Government is involved primarily in the grain milling, palm and coconut oil refining, and fishing sectors. Equipment requests for government purchases are generally submitted by the end user, and purchases are made through the departmental purchasing office. However, with the increased autonomy being given to government-owned firms, purchase decisions are increasingly being made by the individual enterprise. Thus, in making a sale, it is neces-

sary to approach the manager of a particular plant or project as well as the government officials in charge of the appropriate department. It is also advisable to contact the purchasing office to discuss financial arrangements and purchasing procedures.

An enterprise that is totally foreign owned usually makes major purchases in its own home country. Foreign-domestic joint ventures often carry equipment-purchase clauses; under such agreements the majority of machinery is purchased in and from the country of the foreign investor. Marketing approaches to such firms should be made at both the overseas headquarters as well as to local management. Private Indonesian managers often are familiar with the needs and long-range plans of their companies and are usually knowledgeable about the capabilities of leading equipment. A direct marketing approach is most effective with domestic enterprises.

Foreign Suppliers Universe

Almost every major manufacturer of food processing machinery in the world is represented by a piece of equipment somewhere in Indonesia, but no brand preferences have been established. The sales leader in any given year is often the result of purchases for a single major project. Equipment is purchased from both agents and manufacturers' sales personnel in Indonesia, from agents in Singapore, from franchise dealers in Taiwan and Japan, and from manufacturers directly.

Major general-use food processing equipment manufacturers are located in Japan, Germany, the United States, Taiwan, and the United Kingdom. Japanese firms have done well in sales of freezers (Nissei Swedan Freezer Seizo K.K.), candymaking equipment (Osa Machinery Company. Ltd) and packaging machinery (Mitsubishi Heavy Industries Ltd.). German suppliers have sold bakery items (Fr. Winkler K.G., Werner & Pfleiderer, and Josef Muller & Sohne Spezial Fabrik Fur Backeremaschinen), and a U.S. firm (FMC) has sold processing equipment through offices in Japan, Hong Kong, Singapore, and the United States. Machinery from the United States attracts interest because of technical excellence, but it is most often sold where an American advisor is part of the project. Taiwan manufacturers have made sales of vats, sterilizers, cookers, trays, mixers, and ovens, as well as some canning, meat handling, and packaging equipment.

Firms in other countries tend to specialize in providing equipment to certain portions of the industry. For example, Sweden and Swiss firms manufacturers

offer high-technology dairy processing and testing equipment; U.K. firms offer bakery equipment and Italian firms offer noodle and macaroni machinery. Bakery (Globe and Viking) and chocolate-making equipment constitute a prosperous field for firms from the Netherlands.

Equipment from Japan, Taiwan, and China is often small, lightweight, and relatively inexpensive, and therefore it is suitable for small firms interested in single-item purchases. The low prices and credit arrangements offered by Japanese manufacturers allow medium-size firms to add entire processing lines. All equipment from China comes through the China National Machinery Import and Export Corporation.

German manufacturers are known for their quality machinery, which is geared to medium-size operations. The indepth consulting services that they offer are a real plus, as such services would normally be beyond the financial means of medium-size firms. The fine reputation that German manufacturers have in other fields has followed their products into the food processing industry.

The following is a list of manufacturers supplying Indonesia with food processing machinery and accessories.

China

China National
Machinery Import
and Export
Cooperation

Germany

Baader
Bauermeister
Braun Schweiger Maschinenbauanstalten (BMA)
Celemens & Vogl
Demig
F.B. Lehmann Maschinenfabrik
Fr. Winkler, K.G.
G.L. Eberhardt
Hassia
Industrie-Werke Karlsruhe A.G.
Josef Muller & Sohne Spezial Fabrik Fur Backere
Maschinen
Lanco
Lanico-Maschinenbau
Strekel & Schrader
Thormetall
Werner & Pfleiderer

Italy

Bimac
Buhler-Miag
Excelsa
Gol Fetto
Gromax
Okram
S.A. Bertuzzi

Japan

Fujisawa Manufacturing Co., Ltd.
Globestar
Gordon Johnson Japan Co., Ltd.
Hanaki Manufacturing Co., Ltd.
Honda
Izumifood Machinery Co., Ltd.
Kyowa Agricultural Machinery Co., Ltd.
Mike Popcorn Company, Inc.
Mitsubishi Heavy Industries, Ltd.
Nissin
Nisshin-DCA Foods
Omori Machinery Co., Ltd.
Osa Machinery Company, Ltd.
Oshikiri Machine Works Co., Ltd.
Rheon Automatic Machinery Co., Ltd.
Satake Engineering Company
Tokyo Milk Machine Company
Yamaguchi Iron Works
Yaesu Shokki Manufacturing Co., Ltd.
Yamamoto
Yamatake-Honeywell
Yamato Sanko Manufacturing Co., Ltd.
Nissei Swedan Freezer Seizo K.K.

The Netherlands

Akala
Bakkerijmachines GJ Joosten
Conservenmachines
Do Kex
N.V. Arnhem H. Jansen Machinefabriek
N.V. De Vuurslag
N.V. Simon-Heesen
N.V. Sormac-Backus
Pioneer
Uhlmann Canco

Sweden

Rolo Revent
Tetra-Pak International AB

Switzerland

Artofex
Buhler Brothers
SIG

Taiwan

Advanced Drying Equipment Co., Ltd.
Everbright Engineering Co., Ltd.
Faith Engineering Co., Ltd.
First International Corporation
Kuan Chyou Machinery Co.
Tai Shin Machinery Industrial Corp.
Wen Hsing Machinery & Electronic Industry Corp.
Yih Shing Cherng Machinery Co., Ltd.
Yueng Seng Machinery Mfg.
Yung Sheng Iron Factory

United Kingdom

ABR Food Machinery Company
Asco Solenoid Valves
Atlas Equipment Ltd.
Baker Perkins Ltd.
Bakey Ltd.
Biro Manufacturing Company
Bliss
Brierley
Fords Finsbury
Mono Universal
Peters Packaging Ltd.
Simon-Vicars Ltd.
Tweedy of Borney Ltd.

United States

AFM Company
AMF Fogel Refrigerator Company
Angelus Sanitary Can Machine Company
Automatic Time Controls
Carrier
E.W. Bliss
FMC Corporation
Honeywell Inc.

Marketing Factors

The two major routes to selling food processing equipment in Indonesia are direct sales to the end user and sales as part of a partnership or franchise arrangement.

Most Indonesian agents carry several lines of equipment from a variety of countries and handle food processing equipment as part of a large trading company operation rather than as a specialty. Approximately one-fourth of all equipment purchases are made through such firms.

Indonesian buyers sometimes look to Singapore to make contacts, since there is greater selection in product lines. Some Singapore-based representatives assign sales personnel to Indonesia on either a permanent or part-time basis.

Manufacturers, especially from Taiwan and Japan, send salesmen to Indonesia for extended trips to make initial contacts and direct sales. For example, Osa Machinery Company (Japan) has approached several candy manufacturers with the possibility of installing entire lines for novelty chocolate and hard-candy items.

Equipment from Europe, especially Germany and the United Kingdom, is sometimes sold through franchise dealers in Japan and Taiwan.

For direct sales, industry spokesmen highly recommend that arrangements be made by an agent or distributor permanently located in Indonesia and readily available for both presale technical assistance and postsale followup service.

The largest equipment sales in recent years have been in partnership or financing arrangements. Many foreign or international firms are involved in partnership or franchise arrangements as a means of providing opportunities for equipment sales and import markets for raw materials. For example, the U.K. Government provided both low interest and a long-term repayment schedule for a large bakery expansion with the stipulation that 75% of the machinery be from U.K. suppliers. Also, an Australian sweetened condensed milk operation has provided an outlet for large quantities of Australian powdered milk.

Delivery schedules for large purchases of equipment are not regarded as a problem; expansion plans are usually developed with delivery dates in mind.

However, with single-purchase items and spare parts, the short waiting period for items from Japan, Taiwan, and Europe is considered a plus. Many spare parts are fabricated in company maintenance departments or in local metalworking plants.

For exercising warranties, large international and foreign companies have direct access to the manufacturers of machinery through their home offices. The rest of the companies that have modern equipment have not had difficulty making the manufacturers assume responsibility for the performance of their equipment.

Because of limited local expertise, installation and training are considerations that are heavily weighed by buyers of small and medium-size equipment.

Technical assistance—from project planning to operation and maintenance training—must be offered with all equipment. Several firms mentioned the necessity of including printed operating diagrams and maintenance instructions on the machinery; manuals should be made available in Bahasa Indonesia.

Standard training periods should be extensive for Indonesian equipment operators. Many industry end users and agents believe that training Indonesian personnel abroad is good business—to expose them to sophisticated, sanitary methods of food processing and give them experience in production scheduling and management. Several foreign advisors believe that overseas training helps to establish equipment preferences for purchases by future Indonesian managers.

Salesmen are advised to become familiar with U.S. FDA and other regulations for products related to their equipment and be willing to assist manufacturers in meeting those requirements. Many Indonesian producers, capable of processing food to international quality standards, are interested in supplying the growing export market but have problems conforming to processing and packaging regulations that vary among countries. For example, sardines going to some European countries must be packed differently from those going to the United States. This specialized treatment raises production costs and often forces firms to direct export efforts to one specific market to the exclusion of others. Export targets have been shown to be directly related to equipment purchases.

Information on the import regulations of the receiving country might also be of value and prevent repetitions of past disasters—e.g., shipments of frozen food melting on docks, because a document was missing; or unexpected taxes cutting profits in half and necessitating lengthy legal procedures.

Machinery capacity is a definite factor in equipment purchases. Processing is an infant industry, and often manufacturers purchase moderate amounts

now and plan expansion in 2 years. Several processors have been victims of oversell or have bought equipment that is incompatible with their existing lines. Therefore, costly equipment may not be used to capacity or may not be used at all. Firms should deal realistically with the needs of the clients.

Size of the end product is also a consideration for processors. The Indonesian consumer's lack of refrigeration and storage facilities and low income necessitates the production of goods in small quantities, for example, single packaged sweet rolls and half-loaves of bread, and milk in pints and quarts rather than gallons.

Sales approaches that emphasize savings accrued through automation, and profit increases that occur through close tolerance production are recommended. A valuable device is a projection that demonstrates the time period in which machinery purchase costs can be recovered through production savings. Another approach is the package proposal by several manufacturers for turnkey operations. Technical assistance and financing, and perhaps sources of raw materials to supplement those available in Indonesia, should be detailed.

Suppliers and agents are still experimenting with publicity methods. Magazine advertisements and brochure mailings have been used, in addition to personal calls by salesmen employed by several firms considering expansion into new fields. Until equipment reputations and brand preferences are more solidly established, the first manufacturer to approach a firm with a creative proposal will have a distinct advantage.

Since there is little opportunity for direct investigation and equipment comparison by end users in this industry, exposure is a major factor in making sales. Attractive informational brochures sent by mail or left by salesmen are read, saved, and used for future reference. Descriptive literature containing detailed technical information is more valuable when supported by a resident agent who calls regularly, is knowledgeable in the field, and is willing and able to provide technical assistance to clients.

The Indonesian Food Technology Association, Jakarta, actively promotes advancement in the industry and adherence to quality-control regulations. This association tries to expose manufacturers to new equipment and methods of improving sanitation and quality control. Many managers read *Food Processing* and *Packaging and Modern Packaging*, and a surprising number use various U.S. Department of Agriculture and other U.S. Government publications as steady sources of reference material.

Response to trade shows or seminars is difficult to predict because the main target group, the owners of middle-size firms, has not traveled widely and been

exposed to such events in other countries. Indonesian attendance at the Processed Food Show in Singapore and response generated by the U.S. Food Team in Indonesia in mid-1976, plus interest in the technical aspects of production, indicates that a combination demonstration-seminar-equipment show would gain support. Since Indonesians lack previous experience with this type of event, thorough groundwork would be needed to build interest. Advance planning would permit entrepreneurs to schedule their time so they could participate.

COMPETITIVE POSITION OF U.S. SUPPLIERS

The wide availability of U.S. processed food products has given the United States a reputation for quality in processing, which in turn has led to interest in and respect for U.S. processing equipment. Exposure to moderate-size U.S. firms through the Processed Food Show and the Food Team has begun to change the far-ranging impression that U.S. technology is of interest only to large scale multimillion-dollar projects.

In addition, retired food company executives of the International Executive Service Corps with their knowledge and ability to work with their Indonesian counterparts have brought esteem to the U.S. food processing industry. Their recommendations have also resulted in purchases of U.S. equipment.

Ways to Improve U.S. Suppliers' Market Position

Limited direct exposure to equipment from U.S. manufacturers has meant that potential buyers are unfamiliar not only with its capabilities but also with its availability. For example, one of the major chocolate manufacturers was not aware of the number and quality of American chocolate products and, in fact, had never heard of Hershey.

U.S. manufacturers are advised to work with clients to obtain financing and to consider competitive credit arrangements for established firms making total-line purchases or undergoing major modernization. Single-item purchases can be offered on 120-day notes, and sellers of such equipment should be prepared to help clients with step-by-step, line-purchasing plans that lead to total modernization.

U.S. sales representatives are urged to follow through on initial contacts. A onetime appearance will not make a sale, nor will it provide the after-sales service that leads to future equipment purchases.

Promotional Programs

A well-trained resident representative who calls regularly, technical and financial assistance, consultation and training programs, and aftersales services are prerequisites for selling food processing equipment.

The food processing and packaging sector is one for which a demonstration-type trade show with local industry cosponsorship would be in order. It should focus on small- and medium-capacity machines and should have wide publicity geared toward all levels of the industry. Followup calls in the factories and plants would provide specific details and technical requirements and the opportunity for discussion at length.

A week-long event with a different seminar and demonstration emphasis every day could be sponsored. Related topics could be offered on consecutive days so that interested persons could attend for only 1 or 2 days. In many factories, limited managerial and technical expertise precludes long absences by the top-level people. Consideration might also be given to sponsoring a traveling show at various locations besides Jakarta. Any such event should include times for inviting the general public, to help gain consumer acceptance of processed food products.

Invitations and announcements, with personal calls or visits by agents or trade show sponsors, would increase interest and attendance and begin to establish the kind of atmosphere conducive to future sales.

Attractive equipment brochures are an excellent means of reaching a wide audience in this sector. Such publications should be of high quality and should include complete technical descriptions, offers of consulting services and technical assistance, and a return form to request additional information or a visit from an agent. An Indonesian return address should be used, and the request answered promptly. Brochures of the same quality should be made available in Bahasa Indonesia. Regulations require that such material be printed in Indonesia (see Printing and Publishing Sector). Brochures can be mailed, distributed at shows and conventions, or left by salesmen and agents on calls.

The Jakarta Fair, held in late June and early July, offers an opportunity to expose potential buyers to U.S. equipment and to introduce consumers to processed food products. For example, the American Donut stands attracted considerable attention at the 1976 Fair, as did the sales booths of several cookie and snack-food firms.

A turnkey or package proposal is another approach with sales possibilities. Several manufacturers could offer a package of processing and packaging

equipment comprising a complete line of compatible equipment. This line could include raw materials and/or agricultural assistance, if applicable.

U.S. processors who are interested in expanding both production and export markets might consider working with an Indonesian processor to accomplish these aims. Presently, several foreign firms are negotiating arrangements to establish local processing for items that can be produced easily in Indonesia; specialty items are then supplied from the firm's foreign production. This type of arrangement also provides

an opportunity for sales of second-hand U.S. processing equipment.

Sales in the fishing industry require very different methods, as the supplier must go out in the field and deal directly with end users. Major firms can be contacted directly, but small buyers can be reached most effectively through demonstration projects. Entrenched habits and practices will have to be changed before the full market potential is reached for all types of fishing equipment, boats and motors, and storage equipment.

Forest Resources Production

Indonesia possesses the richest forest resources of any country in East Asia, and is expected to produce 23.5 million cubic meters of wood products in 1976. Next to petroleum and natural gas, forest product exports are Indonesia's second largest source of foreign exchange earnings. Gross foreign earnings from the sale of forest products should reach \$1.5 billion in 1980, triple the 1975 figure of \$480 million.

Through the end of 1975, 284 forest exploitation licenses granting loggers permission to operate timber concessions had been issued by the Indonesian Directorate-General of Forestry. More than 128 firms operate various types of wood processing industries, including sawmills and plywood factories. As of December 1975, approved capital investment since 1967 in the forestry sector totaled nearly \$1 billion, of which 57% or \$568 million was from foreign sources.

In spite of its large forest reserves, Indonesia is one of the world's lowest per capita consumers of paper. In 1976, 91% of domestic output of paper was produced by five State-owned corporations. Domestic paper production supplied less than 25% of the country's consumption requirements. Through the rehabilitation and expansion of old plants and the construction of new ones, Indonesia hopes to be self-sufficient in paper and pulp production by 1985.

In 1975, the total Indonesian market for timber harvesting, handling, processing, and production equipment amounted to \$14 million with Japanese suppliers enjoying the largest share. The size of the capital goods market for both pulp and paper mills, and pulp and paper machinery was approximately \$4.9 million in 1975 with Japanese and West German suppliers dominating the market.

The best opportunities for the sale of American-made equipment are in the area of logging machinery, strongly built portable sawmills, chainsaws, lathes, sanders, and dry kilns. American manufacturers interested in selling pulp and paper equipment might best approach the market through "turnkey" projects, consulting services, and developing new techniques for making paper out of such available raw materials as bagasse and mangrove.

WOOD HARVESTING AND PROCESSING INDUSTRY STRUCTURE AND SIZE

Forests cover 130 million hectares or 66% of the total land area. About 10 million hectares or 23% of the forested area is accessible for immediate exploitation. Thirty-four percent of these forests are located on Kalimantan; 31% in Sulawesi, the Moluccas, and Irian Jaya; 23% on Sumatra, and the remainder on Java, Madura, and Nusa Tenggara. A United Nations study indicates that between 20 to 25 million cubic meters of wood could be logged annually without damaging the country's reserves.

The forests produce a rich variety of wood species. The Dipterocarpa group—which includes such valuable species as the Shorea, Pshorea, and Pentacme (all three known as Meranti in Indonesia)—is found on Sumatra, Kalimantan, Sulawesi, and in the Moluccas. Agathis (Agathis Borensis) grows on Java, Madura, and Kalimantan. Keruing is most common in Kalimantan and Sumatra, while Pine (Pinus Merkusii Jungh) is widespread on Sumatra and Java. Gonystylus, ramin, is found exclusively in Kalimantan.

Meranti and ramin are not only suitable for the mass production of plywood and veneer, but also are transported easily in log form because they float and are resistant to insect and fungi damage. The non-Dipterocarpa forests of Irian Jaya are especially suited for the production of mixed hardwood chips, fiberboard, chipboard, and paper.

Teak, which grows only on Java, is in high demand by the furniture and fancy wood industry in Europe, while pine is both a source of timber as well as a potential raw material in the production of pulp, paper, and resins.

Total forest production grew from 10.8 million in 1970 to 26.2 million in 1973 (see table 1), but fell to 21.6 million in 1974 due to the worldwide recession and to excessive cutting during the previous year.

Approved investment in the forest industry as of 1975 was about \$995.9 million, of which approxi-

Table 1.—Indonesia: Production and Exports of Forest Products

(millions of m³)

	1970	1973	1974	1975	1976	1980
Logs						
Production	10.8	26.2	21.6	22.0	23.5	25.0
Exports	7.4	19.4	18.0	11.0	18.0	14.5
Sawnwood						
Production	0.5	1.4	1.9	2.4	2.7	4.0
Exports	0.1	0.3	0.4	0.4	0.5	2.0
Plywood						
Production	(¹)	(¹)	(¹)	(¹)	0.2	0.5
Exports	—	—	—	—	—	0.3

¹ Production for 1970-75 less than 100,000m³ per year.

Source: Directorate-General of Forestry, estimates based on trade source interviews.

mately 57% (\$568 million) is foreign investment.¹ Although the Philippines account for \$306 million of total approved investment, one Manila-based firm, A. Soriano y Cia, is controlled by U.S. interests and represents 30% of the Philippine total. Other large investors include: South Korea (\$62 million); Japan and Malaysia (\$49 million each); Hong Kong (\$38 million); and the United States (\$34 million).

Foreign exchange receipts from the sale of forest products rose from \$108.9 million in 1970 to \$725 million in 1974 (see table 2), but owing to adverse economic conditions in its prime overseas markets, Indonesia's foreign exchange receipts plummeted 51% to \$480 million in 1975. Industry sources see sales increasing now that the Japanese and European economies have shown considerable improvement.

The Indonesian military maintains close links to the forest industry. A number of corporations set up by the military to provide employment to retired soldiers and veterans hold forestry concessions, and through these, high ranking Army and Navy officers are represented in many timber companies and joint ventures.

Leading Firms

Although wood harvesting and processing operations are located throughout Indonesia, the majority are concentrated on the islands of Sumatra and Kalimantan, where most of Indonesia's economically accessible forests are found.

Through September 1975, 284 forest exploitation licenses had been issued by the Directorate-General of Forestry (DGF) with 171, or 60%, of them to concessions located in Kalimantan and 53, or 19%, in Sumatra. Hong Kong, Japan, Malaysia, and the Philippines account for over 70% of the total permits and licenses issued.

¹ Approved investment is the authorized level of capitalization permitted by the Indonesian Government. Total actual investment in 1975 was less than 30% of approved investment.

Table 2.—Indonesia: Export Earnings from the Sales of Forestry Products

(in millions of U.S. dollars)¹

	1970	1973	1974	1975	1976	1980
Logs (nontek)	99.4	532.3	661.9	449.2	900.0	900.0
Sawnwood (nontek) ..	2.7	14.6	18.1	12.3	50.0	400.0
Teak logs	2.9	15.7	19.6	13.3	14.1	16.0
Plywood and veneers ..	—	—	—	5.0	22.0	140.0
Subtotal	105.0	562.6	699.6	478.9	986.0	1,506.0
Pulp wood	0.1	0.6	0.7	0.5	0.5	1.0
Miscellaneous nonwood						
Forest products	3.8	20.4	25.4	17.6	18.3	25.0
Grand Total	108.9	583.0	725.0	497.9	1,004.5	1,532.0

¹ Totals may not add due to rounding.

Sources: Directorate-General of Forestry, estimates based on trade source interviews.

Table 3.—Indonesia: Major Producers of Processed Wood as of Mid-1976

Name and Location	Major Product	Annual Capacity
P.T. Kalimanis		
Samarinda, East Kalimantan ...	Plywood	1.8 million sheets
P.T. Rajah Garuda Mas		
Medan, North Sumatra	Plywood	1.8 million sheets
P.T. Sumatra Plywood Industry		
Kota Pinang, North Sumatra ..	Plywood	.6 million sheets
P.T. Kesuma Karya Jaya		
Palembang, South Sumatra	Plywood	3.5 million sheets
P.T. Cipta Rimba Raya		
Medan, North Sumatra	Plywood	1.8 million sheets
P.T. Aceh Plywood Industry		
Kuala Langsa, Aceh	Plywood	1.1 million sheets
P.T. Satya Jaya Raya		
Desa Gunung Sugih, West Java	Plywood	2.9 million sheets
P.T. Kutai Tjember		
Probolinggo, East Java	Plywood, Veneer	4.4 million sheets
P.T. Nusantara Plywood		
Desa Sidorrukun Indro, East Java	Plywood, Veneer Parquet	1.8 million sheets
P.T. Hendratna Plywood		
Banjarasin, Sourt Kalimantan .	Plywood	2.5 million sheets
P.T. Rimba Ramin Raya		
Pontianak, West Kalimantan ..	Plywood	1.8 million sheets
P.T. Sheui Tai Plywood		
Pontianak, West Kalimantan ...	Plywood	1.8 million sheets
P.T. Sunrise Plywood		
Palembang, South Sumatra	Plywood	1.8 million sheets
P.T. Tajung Jati		
Kota Agung, Lampung	Sawnwood	50 m ³ input
P.T. Bumi Indah Raya		
Pontianak, West Kalimantan ...	Sawnwood	100,000 m ³ input
P.T. Kayu Papa Enterprises		
Pontianak, West Kalimantan ...	Sawnwood	100,000 m ³ input
P.T. Djajanti Raya		
Banjarasin, South Kalimantan	Sawnwood	100,000 m ³ input
P.T. Porodisa Trading Industrial Co.		
Samarinda, East Kalimantan ...	Sawnwood	50,000 m ³ input
P.T. Satya Djaya Raya		
Bulungi, East Kalimantan ...	Sawnwood	50,000 m ³ input
P.T. Kayan River Timber Products		
Keburao, East Kalimantan	Sawnwood	64,000 m ³ input
P.T. Kauy Mas		
Samarinda, East Kalimantan ...	Sawnwood	163,000 m ³ input
P.T. Inhutani		
Samarinda, East Kalimantan ...	Sawnwood	100,000 m ³ input
P.T. Asean Vetran		
Samarinda, East Kalimantan ...	Sawnwood	88,000 m ³ input
P.T. Sangkulirang		
Sankulirang, East Kalimantan ..	Sawnwood	60,000 m ³ input

Source: Directorate-General of Forestry.

There are 128 firms operating more than 54 major sawmills, 12 plywood factories, and 3 moulding and dowel facilities with another 9 sawmills and 5 plywood factories scheduled to begin operations by the end of 1976 (see table 3 on facing page). Other wood product facilities in operation include 10 match factories, 27 box factories, and over 300 furniture manufacturing firms, most of which, along with about 100 small sawmills, operate on a cottage-industry scale.

Approximately 100 foreign firms are engaged in one or more aspects of the timber industry, either as wholly owned operations or in joint ventures with local Indonesian partners. The leading foreign firms include: Maubeni, Mitsui, Mitsubishi, and Sumitomo of Japan; Weyerhaeuser and Georgia Pacific of the United States; and A Soriano y Cia of the Philippines. The three U.S. firms are discussed below.

P.T. Weyerhaeuser Indonesia.—Weyerhaeuser has operated a wholly owned concession known as P.T. Weyerhaeuser Indonesia since 1971 and also has been involved in a joint venture with the military owned P.T. Tri Usaha Bhakti's subsidiary, P.T. IRDA (Indonesian Regional Development Agency), called P.T. International Timber Corporation Industry (ITCI), which began operation in 1970. ITCI is 65% owned by Weyerhaeuser, but company executives expect this to be modified in light of the Indonesian Government's 1975 decree mandating that at least 51% of a company's shares be in the hands of the local partner over a 10-year period.

Until 1976, both Weyerhaeuser concessions have been solely logging operations with most of the production exported to Japan, South Korea, and Taiwan. However, Weyerhaeuser, like all firms operating such concessions, is required to establish a downstream processing facility within a reasonable amount of time. In mid-1976, ITCI was considering a plan to construct a sawmill and chipmill plant at its Kenagan concession near Balikpapan in East Kalimantan. The sawmill will have an eventual capacity of 150,000 cubic meters of sawnwood per year and the chipmill plant, 225,000 cubic meters. The cost of both facilities is estimated at \$13.6 million. Weyerhaeuser is conducting reforestation experiments involving some 2,000 hectares on its concession in East Kalimantan. These experiments are the first of their kind in Indonesia and involve such techniques as common planting of mixed species, as well as varying the distances between the different stands. In addition, Weyerhaeuser is experimenting with nonindigenous species to determine if their cultivation on a large stand basis is possible.

A. Soriano y Cia.—Operating in Indonesia under the name of P.T. Kayan River Timber Products, this Philippine firm in 1971 began a 1.2 million hectare concession in the Bulongan district of East Kaliman-

tan. In 1976, Kayan River began a sawmill operation, which is projected to produce 85,000 cubic meters of sawnwood per year. The sawmill cost \$3 million, a portion of which was financed through Japanese interests, who in turn will receive the first year's shipment of sawn timber. Tanaka of Japan supplied the specifications for the mill's new equipment, which included purchasing four Komatsu forklifts.

Kayan River has spent more than \$22 million for the purchase of logging equipment and the construction and development of the requisite physical infrastructure. Such purchases included the acquisition of Caterpillar bulldozers, skidders, tractors, scrapers, Mack trucks and Toyota land-cruisers. Sky-line logging equipment for extracting logs in hilly areas also has been purchased.

P.T. Georgia Pacific.—This American firm operates a logging concession in Samarinda, East Kalimantan. Its 1976 output averaged between 25,000 to 30,000 cubic meters of logs per month with most of its production being exported to Japan, Taiwan, and South Korea. Along with a well-known Indonesian businessman, Georgia Pacific has formed a joint venture called P.T. Kalimanis Plywood Industries, which in 1976 opened a \$3.5 million plywood factory near Samarinda using both Japanese and American equipment. This plant will eventually have an output of 50,000 cubic meters per year of plywood and veneer, with most of the former being sold to Japan and the latter to the United States.

The majority of Georgia Pacific's heavy equipment is of American make and consists of approximately 15 Caterpillar D7C skidders for logging purposes (with 3 to 7 others on order) and 5 for road building. Three Caterpillar 980 loaders and 15 Kenworth 849F trucks are used for transporting logs from camp to rafting facilities at the river's edge. Kalimanis has equipped most of its plywood factory with Japanese equipment, with the notable exception of the lathes, which are of American manufacture.

Unlike most foreign investors, who began timber processing operations only in the mid-1970's, a number of major Indonesian-owned firms have operated such facilities since 1970. Six of these are: P.T. Tandjung Djati (including P.T. Kesuma Karya, the firm's plywood factory); the Kayumas Group; the Jajanti Timber Group (which includes the Nusantara Plywood Factory); Satya Jaya Raya; Hutan Raya Utama; and P.T. Bumi Indah Raya.

P.T. Bumi Indah Raya.—This firm, located in Pontianak, West Kalimantan, was established in 1968. Currently involved in both logging and wood processing Bumi Indah Raya employs approximately 3,500 people in various occupations, ranging from unskilled laborers to highly trained technicians. Aside from producing an average of 15,000 cubic

meters of logs per month, it operates three sawmills with a monthly production averaging 6,000 tons of sawn timber. These facilities also produce dowels, moulding, and laminated wood with a combined capacity of 3,380 cubic meters per month.

Bumi Indah Raya's concession in West Kalimantan covers an area of 225,000 hectares with Ramin, Jelutung, Jonkong, Meranti, and Agathis, the main exploited species. With the exception of Ramin log (which by government order must be processed in Indonesia), logs are either exported directly or are processed at one of the company's three sawmills located near Pontianak.

Because of an abundant supply of labor and a favorable terrain, Bumi Indah Raya employs a logging method known locally as *kuda-kuda* (literally, "horses"). Teams of laborers, usually 10 or 12 to a team, use both traditional and modern tools to fell trees and to haul the logs to a narrow gage railroad from where the logs are transported to the riverside. Here the logs are tied together in the form of a raft, and towed down the river by the company's tugboat either to the sawmills for processing, or to ships for export.

Kuda-kuda has come under sharp criticism by some firms (usually those using capital-intensive methods) who believe traditional methods are inherently "inefficient."

However, Bumi Indah Raya feels that such reasoning fails to take into account two key variables that affect operating costs: the supply of labor and the prevailing topography in West Kalimantan. In Central and East Kalimantan there is both a shortage of local labor and a number of hills and high mountains which require the application of mechanical handling equipment. This is not so in West Kalimantan which is swampy and flat, making it almost impossible to use skidders which often become bogged down in mud. In addition, Bumi Indah Raya's loggers are paid very well (much above the annual wage of the average Indonesian worker) and receive such fringe benefits as housing, free health, accident and life insurance, as well as a number of paid holidays per year. Loggers also work a fixed number of hours per day.

Bumi Indah Raya's three sawmills were sold as turnkey projects and installed in 1970 and 1971. Two of the units are Japanese made, one an Ishida, the other an Aikoku. The third unit is a Meng Huen manufactured in Malaysia under a U.K. license. Each complete unit comprises the following machines:

Breakdown saw	60''	1 unit
Resaw	40''	2 units
Edger	40''	2 units
Cut-off saw	16''	4 units

The company's dowel line comprises one Hawker-Nash linkup of U.S. manufacture with a Japanese rip

and circular saw, while the moulder unit, a Weining, is West German made.

Electric needs are supplied by three Skoda power units of Czechoslovakian make, three MWM and two Deutz generators (Germany), and two U.S. made McLarens.

A sizable amount of the firm's processed wood is loaded onto the company's own ship, which sails twice monthly to Singapore, where individual orders are loaded onto larger ships for shipment to overseas destinations. Most of Bumi Indah Raya's sawnwood is sold to Europe, while the dowels and moulding are marketed in the United States and Canada.

The firm's three other concessions (Central Kalimantan, South Sulawesi, and Irian Jaya) total 640,000 hectares (mostly in mountainous regions), which in the company's opinion will require the application of capital-intensive methods if the operations are to be carried out economically. The firm anticipates buying 6 tractors, an additional crawler-type tractor, 13 trucks, and a number of dump trucks for its Central Kalimantan operations. Similar types and quantities of equipment are expected to be purchased for the North Sulawesi and Irian Jaya concessions.

The Company's future plans include the establishment of a pulp and paper factory at its Irian Jaya concession and it is actively seeking a foreign partner to form a joint-venture operation.

P.T. Raja Caruda Mas.—A recently established major firm manufactures plywood panels at its factory located approximately 70 kilometers northwest of Medan, North Sumatra. Production began on a limited scale in April 1975, with an initial output of 2,000 panels per day. At full capacity, the factory will employ 500 Indonesians, run 20 hours per day, and produce 8,000 panels daily. It is expected that Garuda Mas will be running at full capacity by 1977. Garuda Mas employs a mix of machinery including German automatic grinding machines, saws, dryers, and boilers for the generators. Peeling machines, presses, and glue-cooking equipment are of Japanese origin. Germany provided the technicians for installing this equipment as part of the purchase contract. The U.S. equipment owned by the facility includes Product Machine Incorporated's rotary peeling lathes, Prentice clippers, and five Caterpillar generators. The company buys German glue and U.S. (Cello-set) repair putty.

PRINCIPAL GOVERNMENT OFFICES

The Indonesian Government, through the Directorate-General of Forestry (a subordinate body of the Department of Agriculture), exercises direct control over the country's forest resources. The Directorate-General of Forestry (DGF) is subdivided into

four functional directorates and one secretariat, which oversee all operations regarding administration, planning, reforestation, conservation, wildlife management, production development, and marketing. The directorates are responsible for ensuring that the Government's forestry policies are implemented and that the various agreements issued to concessionaires are complied with. Until 1979, when a new forestry building is scheduled to be completed, the DGF is located at Jalan Salemba Raya 16, Jakarta. A publication in the Indonesian language is available from the Production Development Directorate listing all concessionaires and their major activities.

The Forest Research Institute and the Forest Products Institute, which provide technical and research capabilities to the Government, were formerly under the DGF. However, the organizational structure of the DGF was amended in 1975 and both institutes were temporarily placed under the control of the Minister of Agriculture. Both institutes have their offices in Bogor, West Java.

Perum Perhutani (the State Forestry Corporation), its headquarters at Jalan Gatot Subroto 17-18, Jakarta, not only operates an integrated forest products industry in Central and East Java including the production of turpentine, pine resins, and honey, but administers the forest resources in those areas.

Perhutani has a considerable amount of internal freedom regarding administration, planning, and procurement. However, it is responsible to a Board of Supervisors which includes the Minister of Agriculture, the Director-General of Forestry, the Governors of Central and East Java. The Board, in addition to its supervisory role, serves as a policy-making body.

P.T. Inhutani I and P.T. Inhutani II are two additional State-owned corporations, which were converted in the early 1970's into limited liability firms and operate forestry concessions in South and East Kalimantan. A third State-owned firm, P.N. Inhutani operates in Central Kalimantan and has yet to be converted into limited liability status. These firms are headquartered in Jakarta.

TRENDS, PROGRAMS, AND PROJECTS

Since 1967, the Indonesian Government has recognized Indonesia's untapped vast forest resources, as a potentially large source of revenue. Furthermore, a developed forest industry would provide needed jobs, thereby helping to reduce the high unemployment level. The instruments of change were a number of government laws and decrees issued in 1967, which opened up the nation's forests for both domestic and foreign exploitation.

Foreign investors operate under contract of work agreements which require foreign firms to share a certain percentage of their profits with the Government. These agreements usually require the investor to build a downstream processing plant, such as a sawmill within a certain number of years. The Government extends certain incentives such as "tax holidays," duty-free import of project capital goods, etc. The logging sector of the forestry industry is closed to any further foreign investment.

As a result of the Government's actions, foreign investment flowed rapidly into Indonesia. This coincided with an increasing demand from Japan, South Korea, and Taiwan for sawn logs, resulting in the price of cut logs doubling in 5 years to \$75-80 per cubic meter in 1973. By 1974, however, the worldwide recession severely depressed the demand for forest products from Indonesia's prime overseas markets. The Indonesian logging industry was slow to respond to the changes that were taking place. In anticipation of even higher prices, logging concessionaires increased their production from 10.8 million in 1970, to 26.6 million cubic meters in 1973. But with the market shrinking, the logging companies found themselves with over 2 million cubic meters of logs on hand, much of which eventually rotted away while floating in the rivers. With such a huge inventory and no immediate sales prospects, wood prices dove to \$25 per cubic meter. Since a sizable portion of the industry was not able to absorb such losses, one-third of the timber producers were forced out of business with another third pressured to drastically reduce their operations.

Another development which was to have far-reaching effects upon the Indonesian forestry industry was related to civil disturbances which occurred in January 1974. That same month, to head off any further disorders, the Government issued two decrees: the first, requiring foreign ventures to reduce co-ownership to less than 50% over a 10-year period, giving the Indonesian partner a majority position in terms of both management and equity; the second, placing limits on both the number and types of expatriates which may be employed in the forestry sector. By 1977, foreigners will be barred from holding blue collar jobs in the industry, and most other expatriate positions in local, foreign, and joint-venture operations will be severely limited.

Other governmental restrictions have been placed on the industry by which concessionaires are being pressured to fulfill their agreements regarding the construction and operation of downstream processing facilities. Generally, there has been a great deal of resistance on the part of foreign firms to invest their capital in anything more elaborate than logging facilities, with most having a "wait and see" attitude before committing large sums of money to the con-

struction and operation of sawmills, plywood factories, and pulp and paper mills. Many foreign firms feel that although the potential for such industries holds promise, the current investment climate requires an investor to be fairly cautious before undertaking a sizable project.

By 1976, new projects for which government approval had been given included 47 sawmills, 13 plywood factories, 4 chipmills, and 2 woodboard plants. A number of factors will influence the initiation of construction on these projects, including market conditions, availability of financing, and the extent to which the Government enforces requirements that logging operations must install downstream processing facilities. It is likely, however, that a significant number of these projects will move into the implementation stage by 1980. Sixteen of these approved projects are considered to be major facilities, and represent an estimated \$112.2 million in capital investment.

INDUSTRY GROWTH PROSPECTS

In spite of the timber price slump of 1974-75, log production increased at an average rate of 9.8% annually, between 1970-75, slightly higher than the growth projected under Indonesia's First Five-Year Development Plan (Repelita I, 1969/70-1974/75). On the basis of government expansion plans and the opinions of industry specialists, production in 1980 is projected to reach 25 million cubic meters of logs per year. With plans for the operation of additional sawmills underway, sawnwood production should reach approximately 4 million cubic meters during the same year, of which 50% of the output is expected to be exported to European, Middle-Eastern, and Asian markets.

As a result of these production increases, as well as the expansion of overseas markets and higher world prices, Indonesia's gross foreign exchange earnings from the sale of all forest products should surpass \$1.5 billion in 1980, a three-fold increase over 1975's figure of \$480 million. The greatest increases should take place in the sale of sawnwood, with foreign exchange receipts topping \$450 million by 1980.

Some industry sources expressed their concern in 1976 about the possible effects on the forest industry of government budget reductions resulting from the financial collapse of the State petroleum corporation, Pertamina. Fears have been expressed that the Government, in its desire to find additional sources of revenue to finance projects scheduled to be implemented under the current Five-Year Development Plan (Repelita II, 1974/75-1978/79), might consider increasing royalties and export taxes leveled

upon logs and processed wood. In addition, many of the foreign corporations operating in the forestry sector are nearing the end of their 5-year tax holidays on corporate profits. In an industry, that is, for the most part, subject to the uncertainties of world markets and had a number of its companies go bankrupt during the recession of 1974-75, the possibilities of the Government taking more than the current 25% of gross sales can only diminish some of the optimism that has gone along with the industry's recovery.

MARKET SIZE

In 1975, the total market for timber harvesting, production and processing machinery amounted to \$13.5 million. Based on evaluation of market data, historical trends, and interviews with government officials and industry representatives, the market is projected to grow at an average annual rate of about 18%, reaching a level of \$30.6 million by 1980 (see table 4.)

Wood production and processing equipment, which accounted for \$9 million or 66% of the total market in 1975, is expected to total \$20.2 million in 1980, approximately two-thirds of the total market. Indonesian purchases of logging equipment fell considerably from \$5.9 million in 1974 to \$4.5 million in 1975, reflecting the depressed state of the world

Table 4.—Indonesia: Size of the Market for Wood Harvesting and Processing Equipment
(in thousands of U.S. dollars)

	1973	1974	1975	1976	1980
Timber Harvesting and					
Handling Equipment ¹					
Imports					
United States	1,269	1,398	768	1,300	2,400
Japan	1,078	3 343	3,088	—	—
Singapore	500	800	400	—	—
Malaysia	100	100	90	—	—
Philippines	50	60	10	—	—
West Germany	50	60	50	—	—
Others	100	120	100	—	—
Total	3,147	5,972	4,506	5,317	10,309
Wood Production and					
Processing Equipment					
Imports					
United States	396	470	182	190	250
Japan	2,923	3,759	3,947	—	—
Singapore	1,917	236	383	—	—
West Germany	1,028	3,104	3,101	—	—
Taiwan	499	938	752	—	—
Australia	119	271	19	—	—
United Kingdom	82	114	310	—	—
Others	1,150	2,300	350	—	—
Total	8,114	11,192	9,044	10,140	20,250
Total Market Size ..	11,261	17,164	13,550	15,457	30,559

¹ Includes wheeled logging skidders; chain saws and accessories; logging chains, cant hooks, tongs, and other specialized logging tools and equipment, but excludes tractors and other heavy equipment used in road building and heavy construction for logging purposes.

Sources: Official Indonesian and supplier statistics and estimates based on trade source interviews.

market for timber and wood products. These market figures do not include tractors and other heavy construction equipment used for road building and other operations directly related to logging. In the first quarter of 1976, 944 units of heavy construction equipment amounting to roughly \$25 million were sold in Indonesia, a significant portion of which went to the forest industry. U.S. manufacturers supplied more than 70% of this. Trade sources predict a \$200 million market in Indonesia for heavy construction equipment by 1980.

There is no domestic production of either timber harvesting and handling equipment or wood processing equipment and there are no plans currently for such production. All Indonesian requirements for equipment in this industry are imported.

Imports

By 1974, Japan had replaced the United States as the major supplier of Indonesian needs for timber harvesting and handling equipment. During 1973 U.S. manufacturers supplied a 40% share of this market by value, and Japanese equipment accounted for 34%. During 1974 the Japanese market share rose to 58%, while the U.S. share dropped to only 23%. These shifts in the relative market share may be attributed in part to aggressive sales techniques employed by Japanese businessmen and the depreciation of the Yen vis a vis the dollar. Japanese-made sawmill equipment has consistently dominated Indonesia's wood production and processing equipment market with an average annual share of 52% during the 1973-75 period. The average share of the market for this equipment claimed by U.S. firms has been approximately 3% annually during recent years. Unless there is a shift to a more active marketing strategy by U.S. suppliers, this situation is expected to prevail.

Japanese manufactured timber harvesting and sawmill equipment is expected to dominate in the Indonesian market through 1980, accounting for more than a third of the industry's estimated \$30.5 million total imports that year. Main reasons for this success have been Japan's heavy investments in the sector, as well as the extension of credit on liberal terms to Indonesian buyers.

MARKET OPPORTUNITIES

With the continued expansion of the forestry industry in Indonesia, opportunities for the sale of equipment will increase. As timber harvesters are forced to go deeper into the interior of the country in order to exploit new timber stands, additional roads must be built. Equipment requirements will

include bulldozers, scrapers, trucks, and some rollers. In addition, tractors, hauling trailers, skidders, cutting and hauling operations. Both inboard and outboard engines, varying in horsepower from 40 to over 100 horsepower will also be required for the rafting and transportation of logs from concession sites to sawmill loading facilities located down river.

Depending on the size and extent of sawmills, breakdown saws, benchsaws, rip saws, edgers and cutoff saws will be needed. Handling devices for moving sawnwood along the production line are found in some plants, especially in those employing chemical treatment baths for wood preservation. As the demand for treated wood increases, demand for more dry kilns will increase also. Forklifts, especially those using diesel fuel, will be in demand, in addition to hoists for loading timber and other processed wood onto barges and boats. Lathes, moulding and dowel machines, sanders, wood presses, and other specialized equipment are among the requirements for new sawmills and plywood factories.

There is an increasing need for reliable, heavy-duty portable sawmills, which can be used for on-site log processing. These machines must be strong enough to withstand the kind of rough treatment received in an average day's operation in tropical forests. As loggers find it necessary to penetrate deeper into the forests to extract logs, more of these machines will be needed. The estimated number of units required by 1980 is between 85 and 115.

By 1980, about 500,000 cubic meters of plywood will be produced annually by about 25 factories. Of this total, an estimated 250,000 cubic meters will be exported. Lathes, sanders, wood presses, dryers, slicers, and other machines capable of producing plywood of export quality will be required. In 1976, there were less than 13 sanders operating in Indonesia capable of doing export quality work. As Indonesia develops new markets for plywood exports, further purchases of such machinery can be expected.

In 1975 there were an estimated 1,800 to 2,500 chainsaws in Indonesia. Experience shows that each chainsaw lasts an average of 10 to 14 months, or in other words, each unit must be replaced yearly. In addition, as the demand for cut logs increases, there should be a parallel increase in the number of new chainsaws required by the industry.

In certain areas of Indonesia, terrain difficulties, such as swamp and bogs, make using conventional logging skidders almost impossible. A number of forestry experts and trade representatives have noted low ground-pressure logging skidders capable of operating in such areas as West Kalimantan and Irian Jaya have marketing potential.

The market for heavy logging equipment will continue to expand. Unlike the wood processing industry, where equipment tends to be sold on a turnkey basis, heavy logging equipment is purchased on a piece-by-piece basis. In order to withstand operation in remote and difficult terrain, Indonesian timber harvesters generally purchase the strongest and most reliable vehicles available. Tractors, trailers, scrapers, and bulldozers are items which will be needed in this category. Firms with concessions located in hilly regions will be interested in the purchase of equipment with sky-line harvesting capability.

As of 1976, there were only three facilities in Indonesia producing high quality dowels and moulding for export, mainly to Canada and the United States. One plant manager said he could not keep up with orders for such products and that he was currently considering an increase in production capacity. Indonesian requirements for dowel and moulding machinery are estimated at between 20 to 35 additional units by 1980.

In 1975, there were five dry kilns in Indonesia, and as the demand for treated wood increases, additional dry kilns will be required.

The Indonesian market for precision woodworking machinery such as that used in the production of furniture, doors, and window frames began to grow more rapidly in 1976. A number of Indonesian firms have expressed interest in purchasing such equipment to increase present production capability.

Buyers Universe

There are at least 70 major buying units in the Indonesian forestry industry. With the exception of the State firms, Perum Perhutani and P.T. Inhutani I and II and P.N. Inhutani, these units are privately owned. The largest enterprises are joint ventures between local and foreign interests, but there are a number of producers that are wholly owned by Indonesians or by foreign interests.

Procurement in the public sector is done on a tender basis which generally favors the lowest bidder. In the case of Perum Perhutani, each unit is responsible for purchasing equipment requirements. Manufacturers or dealers must direct their sales through either Unit I in Semarang, Central Java, or to Unit II in Surabaya, East Java.

American firms, such as Weyerhaeuser and Georgia Pacific purchase their long-term capital equipment needs through their headquarters in the United States. However, immediate needs of spare parts are often purchased through the local procurement office, which in Weyerhaeuser's case, is located in Singapore. A multifaceted approach is thus required in marketing, involving calls on operating personnel

at concession sites in the field, visits to offices in Jakarta and Singapore, as well as to home offices overseas.

Foreign Suppliers Universe

There are more than 50 foreign firms active in supplying equipment to the Indonesian industry. Heavy logging machinery is generally manufactured by multinational firms who have headquarters in the United States or Japan, such as Caterpillar, Hyster, International Harvester, and Komatsu.

Much capital equipment exported to Indonesia is first exported to Singapore and then reexported to Indonesia, as suppliers prefer to keep their inventories in duty-free Singapore rather than export them directly to Indonesia where they have to pay duties and taxes prior to sales. According to a knowledgeable industry source, about 75% of the heavy equipment imported into Singapore is exported to Indonesia.

U.S.-based multinational firms manufacture and/or assemble much of this equipment at offshore locations, such as Singapore or Japan, and deliveries to Indonesia are often made from these locations. Most American suppliers of wood processing machinery, however, manufacture and export directly from their plants in the United States.

In the area of heavy machinery used in logging, Caterpillar, Allis-Chalmers, International Harvester, and Hyster are the major American suppliers. Komatsu is the leading Japanese supplier. Caterpillar had about 40-45% of the heavy machinery market with International Harvester and Hyster having a combined share of about 20%. Komatsu's share of less than 30% is expected to increase somewhat due to aggressive sales practices.

Heavy trucks and other highway equipment are supplied by Mack, Ford, G.M., and Kenworth of the United States, Redford and British Leyland from Great Britain and Toyota and Izsuzu from Japan.

Chainsaws are supplied primarily by McCulloch, Homelite, and Omark from the United States, and Stihl and Dolmer from Germany. Aho is the main Japanese manufactured chainsaw. American chainsaws account for almost 55% of the market by value, and German brands, about 30%. A number of Italian firms, such as Alpine and Patner, also supply chainsaws, but their combined market share is less than 5%.

Japanese manufactured sawmill equipment accounts for over 65% in value of equipment installed, while another 10% is supplied by South Korean and Taiwanese firms. Inshida and Tanaka are the main Japanese suppliers of sawmill equipment. Canali of Germany and SCM of Italy are the most important European suppliers.

PRINCIPAL GOVERNMENT OFFICES

Planning and implementation of construction programs is concentrated to a great extent in the Ministry of Public Works and Power (PUTL). In addition to the State Electricity Corporation (PLN), the three organizations within the Ministry include: the Directorate-General for Housing and Urban Development (Cipta Karya), the Directorate-General for Highway Construction (Bina Marga), and the Directorate-General for Water Resources Development. A few Hawker and Nash dowel manufacturing machines were the only American sawmill or woodworking equipment in Indonesia.

Advantages which Japanese manufacturers have had in their successful sales of equipment to the Indonesian wood processing industry have been the large Japanese investments in the sector and their ability to grant liberal credit facilities to prospective buyers. Many Japanese investments are tied to contracts calling for purchases of Japanese equipment, the majority of which has been bought on a turnkey basis. In addition, Japanese suppliers frequently negotiate production agreements which have tied loans for the purchase of capital equipment. These production agreements require the new processing facility to provide the suppliers with either all or a percentage of the factory's output for a fixed number of years at a fixed price. Such arrangements have generally been to the advantage of the supplier.

Marketing Factors

Most foreign suppliers of equipment to the Indonesian forest products industry have regional offices in Singapore. From Singapore, suppliers monitor sales, as well as provide technical and backup services to their agents in Indonesia. Most agents are headquartered in Jakarta and, depending on the size of the market for the line of goods they carry, many have branch offices in other parts of Indonesia. Heavy machinery distributors often establish an office or agent near or adjacent to logging and processing facilities in outlying areas.

Purchases of small items, such as chainsaws are usually provided by the agent or distributor directly from stock. Heavy machinery and more specialized items are usually shipped from the country of origin, or from stock in Singapore.

Efficient agents and distributors in many cases provide the competitive edge for a particular product in Indonesia. For example, a local distributor for chainsaws was able to increase his brand's share of the market considerably through aggressive sales promotion and personal attention even though the competitors' prices were nearly uniform with his.

Since nearly all of Indonesia's forest industry production takes place in the outer islands, suppliers normally ship equipment directly to a port near the production site. Spare parts often are stocked in Jakarta, however, and must be shipped to end users at relatively high transportation costs.

Interisland shipping charges are relatively high. For example, it costs more to ship an item from Jakarta to Samarinda in East Kalimantan than to ship the same item from Kobe, Japan. Shipping is also relatively slow in Indonesia, requiring several months in some cases. In some instances, spare parts stored in Singapore and needed by Indonesian producers immediately are hand carried by commercial courier services. Delivery, in such cases, is usually within 24 hours. The use of telex facilities and radios has helped to speed up the delivery of spare parts, and many large firms, such as P.T. Kayan River and P.T. Bumi Indah Raya, maintain radio links between field operations and Jakarta offices to expedite such support requirements.

Duties and tariffs vary from item to item and sometimes from port to port but seldom exceed 20%. As of 1976, no technical standards were applied to the operation of wood-processing or harvesting equipment, although the Government's desire to increase the conversion rate of logs to sawnwood may result in standards which would force the replacement of circular saws with more efficient band-saws.

Many Indonesian firms consider warranties covering spare parts and after-sales service of paramount importance. Such complete warranties are not always included in purchase contracts, however, and users have experienced serious installation and service problems as a result, particularly involving some Japanese equipment suppliers, according to trade sources.

Maintaining regular contact with the buyer is a very important factor in selling to the Indonesian forestry industry. Many sales have been made, not so much on the basis of price, but through perseverance on the part of the agent. Visits to the processing facility, as well as the main offices provide the supplier with a better understanding of each particular operation's needs. Understanding the problems of a particular sawmill regarding transportation, finance, and power generating needs can provide the supplier with the information he requires to sell his product by tailoring it to the special needs of the firm.

Agents receive a commission on the sale of forestry equipment, depending on quantity and price. The amount of commission is usually determined at the time the agency agreement is signed. Bonuses are often expected by agents who do well. An agent

whose ordinary commission may be 5-8%, for example, and signs a sales contract to outfit a complete sawmill would almost certainly expect an additional payment of at least 5%.

A number of trade publications, such as *World Forests*, are read by members of the forestry industry in Indonesia. Many local agents, as well as foreign supplier, make use of both the local press and direct mailing services as part of their advertising strategy.

Three trade associations represent the interests of the Indonesian forestry industry. All three have headquarters in Jakarta and local branches scattered throughout the country. These associations hold periodic meetings to discuss common problems and provide membership with informal guidance and a platform to exchange information and ideas. American firms interested in doing business in the forestry sector should contact these organizations since all three have up-to-date information regarding current developments in the industry.

Indonesian Timber Community

Jalan Gatot Subroto 17-18 (Gedung Perhutani)
Jakarta

Wood Products Association of Indonesia

P.O. Box 3543

Jakarta

Attention: Hermanto Tirtoprojo, First Secretary

Indonesian Sawmillers' Association

Jalan Melawai VIII/No. 8

Kebayoran Baru, Jakarta

From time to time, various regional forest industry conferences and promotional activities are held in Southeast Asian cities which attract Indonesian attendance. Miller and Freeman, the publishers of *World Forests*, sponsored such a gathering in Singapore in 1975, and are planning another forum to be held in Manila in the fall of 1977. There are also plans for an official U.S. Government-sponsored Forest Industries Trade Exhibition in Manila in 1977. The Food and Agriculture Organization (FAO) of the United Nations is planning to hold a major forestry symposium in Jakarta in 1978. All these events provide an opportunity for the introduction of new products or processes.

COMPETITIVE POSITION OF U.S. SUPPLIERS AND PRODUCTS

U.S. suppliers continue to maintain a competitive advantage in the sale of heavy logging equipment for two reasons. First, American equipment withstands severe operational treatment in the interior of Indonesia much better than equipment of its main competitor, Japan. American equipment has

proved to perform to the most rugged tasks in the country without breaking down, and generally, has a much lower ratio of time lost due to maintenance and repairs. Indonesian users also express satisfaction with the after-sales service and spare parts availability from such successful American suppliers as Caterpillar, Hyster, and International Harvester. The second reason accounting for the success with heavy equipment sales is that such equipment is purchased on a unit-by-unit basis, unlike in the processing side of the forestry industry where entire sawmills and production plants are bought on a turnkey basis. It is generally easier for U.S. firms to sell on an item-by-item basis, since they tend to specialize in a few lines of equipment, as opposed to Japanese suppliers, who tend to handle a wide range of equipment.

Two American chainsaw manufacturers, Homelite and McCulloch, face their prime competition from German manufacturers. New U.S. technological advances, including a direct drive engine and the development of a lightweight saw, have sharpened America's advantage considerably. The Oregon chainsaw, manufactured by Omark is without question the industry leader in Indonesia with a healthy 45% share of the market. Although the Oregon chainsaw is relatively more expensive than its competitors, its long life and durability has made it very popular in Indonesia.

American equipment for use in the processed wood and plywood industry has advantages in speed, output and accuracy over its foreign competitors. For example, the Hawker and Nash link-up dowel production line is the most popular equipment of its type in Indonesia. When the plywood industry eventually gears up for the export market, a substantial increase in quality will be required. So far, the Japanese-made equipment on the whole, has failed to measure up to the standards required by the export market.

The Indonesian forestry industry has been able to rely on U.S. suppliers to negotiate fair and honest contracts to supply equipment (usually, by a specified date) at an agreed price that includes a warranty for spare parts and services. These contracts are usually all-inclusive, in that they specify exactly what services will be provided and what equipment will or will not be included as a part of the sale, whereas this has not always been the case with the Japanese or Korean suppliers.

However, suppliers of U.S. manufactured forestry equipment are at a disadvantage because of the following three reasons:

1. Most wood-processing equipment is bought as a system or on a "turnkey" basis from one source, while the majority of American suppliers tend to

specialize in a single line of goods and have not shown interest in taking contracts for turnkey installation.

2. American manufactured wood-processing equipment is generally more expensive than comparable items sold by the Japanese, Koreans, and Taiwanese. American suppliers, unlike their foreign competitors, usually sell on a cash basis, seldom if ever extending credit for more than a few months. Japanese suppliers, for example, often offer a choice of attractive financial arrangements.

3. The relatively few American firms who have sent company representatives to Indonesia to investigate market opportunities have done little to followup on prospective sales. American manufacturers of wood-processing machinery have traditionally oriented themselves toward a huge domestic market, and have expressed only casual interest in developing international markets.

Among the approaches that may be taken by U.S. firms to enter the Indonesian market are:

1. Target those areas that offer the best sales potential. Efforts, in particular, should be directed at the plywood industry. American equipment, as previously mentioned, has continually been competitive in this area. This is also true for highly specialized wood-processing equipment used in the production of high quality dowels, moulding, furniture and building components. An individual American supplier will find it difficult to sell sawmill machinery unless he is able to supply such equipment on a "turnkey" basis.

2. Promote American wood-processing equipment on the basis of its technical capabilities, since such equipment is often at a competitive disadvantage in terms of price. The emphasis must therefore be placed on long-run cost savings, higher production levels, warranties and after-sales service. Suppliers of American manufactured sawmill equipment, for example, should be prepared to point out the savings and increased profits resulting from the higher conversion levels obtained through the use of high tolerance American-made equipment.

3. Form a consortium of firms to market sawmill and related machinery since U.S. manufacturers are often at a disadvantage because they tend to supply a limited or specialized line of equipment. One such consortium of wood-processing equipment suppliers already exists in the Pacific Northwest. Such consortia can offer equipment systems tailored to specific production requirements on a turnkey basis. This type of organization would also aid the small-to middle-sized firm which might have difficulty breaking into the Indonesian market on its own. A consortium should include structural and design engineering firms, and specialists in power sup-

ply and generation, as well as arrangements with bankers to assist in financing.

4. Set up training arrangements. Two European firms have set up schools for training in the use of their saws; one in Surabaya and the other in Singapore. The graduates of such schools not only acquire basic skills, but become familiar with the firm's product.

5. Make efforts to overcome the misimpression in Indonesia that U.S. sawmill equipment is not suitable for use on tropical hardwoods because it is designed for cutting pine and other soft woods. According to trade sources, most U.S. equipment which is built to heavy duty specifications is quite capable of handling tropical hardwoods when necessary adjustments are made to accommodate hardwood logs.

6. Consider using sales seminars and point-of-sale demonstrations in connection with trade shows and exhibitions in promoting products. These methods provide a more personal contact with end users and would have good results in selling such specialized equipment as wood kilns, plywood slicers, and wood-treatment equipment. Promotions should be designed to show the relative long-term savings that can be obtained from purchasing an American manufactured machine versus the short-term savings gained from buying a cheaper, though technically inferior product.

PULP AND PAPER INDUSTRY STRUCTURE AND SIZE

In spite of its wealth of forest resources, Indonesia is one of the world's lowest per capita consumers of paper: 12.0 kg per annum by comparison with 290.0 kilograms (kg) per annum in the United States and 20 kg per capita in Malaysia. In 1975, the total consumption of paper products was 282,800 metric tons (MT), of which only 17% of 49,400 MT was produced domestically (see table 5). Ninety-one percent of Indonesia's domestic output of paper products is produced by the five State-owned enterprises. To meet the rapidly growing demand, Indonesia imported more than 82% of its paper require-

Table 5.—Indonesia: Paper Production, Consumption, and Imports
(thousands of tons)

Year	Production	Consumption	Imports
1970	19	123	103
1973	39	208	168
1974	40	248	208
1975	49	282	233
1976	72	322	250
1980	200	480	280

Source: Pulp and Paper Association of Indonesia, Repelita-II, and estimates based on trade source interviews.

ments in 1975. Although some pulpwood is exported, the Government has prohibited the sale of paper products to overseas markets. In 1975, printing and writing paper, newsprint, kraft and boxboard accounted for most of the paper consumed in Indonesia, with local production supplying only a small fraction of this need. Demand for newsprint and boxboard in 1975 was met entirely by imports.

Leading Firms

There were five State-owned paper mills in 1976, operating and producing the majority of Indonesia's paper output (see table 6). Four of the plants were located on Java, and one in South Sulawesi. Most of the plants use a mixture of raw materials, including waste paper, rice straw and stalks, poppy stalks, bamboo, wood chips, and the by-product of sugarcane processing (bagasse).

P.N. Leces.—Located south of Probolinggo in East Java, Leces had an annual capacity of 10,000 MT in 1976. The operation consists of two units: Unit I, with a 1976 capacity of 20 MT per day (originally 10), uses German manufactured Escher Wyss paper machines while the pulp plant has a Dutch system; Unit II (a new plant) has a capacity of 30 MT tons of paper per day and employs both a Escher Wyss paper machine and a Krauss Maffei pulping system. Unit I uses rice stalks as a raw material whereas Unit II employs rice stems.

Leces produces 15,000 tons of paper annually using the following raw materials: rice stalks, 20 tons per day or rice stems, 90 tons per day; liquid soda, 1,800 tons; liquid chlorine, 4,000 tons; wood glue, 150 tons; tapioca, 500 tons; IDO, 11,200 tons; FO, 7,000 tons; Gapekansava, 150,000 sheets; long

fiber pulp, 2,500 tons, imported; caustic soda, 2,500 tons, imported; bleaching powder, 600 tons, imported; kaolin, 150 tons, imported.

In an attempt to improve its product quality, enhance its working efficiency and investigate bagasse as a possible raw material substitute for rice stems, Leces has carried out various research undertakings. These have resulted in the formulation of a four-stage development and expansion plan. The first two (1964-74) involved the construction of an integrated pulp and paper plant at Meguar and additional technical and financial improvements with the objective of increasing output from 30 to 40 tons per day. Stage three (1975-78) involves the replacement of several machines in both units, which should result in a further increase in capacity from 50 to 100 tons daily. The fourth stage will involve the construction of an integrated pulp and paper mill which will become Unit III. This unit, which will include chemical recovery facilities, will boost Leces' total capacity to approximately 225-240 tons per day. Bagasse is planned to be the basic raw material used in the new mill. The cost of implementing stage three and four of Leces' expansion is approximately \$135 million. BAPPINDO (the State Development Bank) and the Canadian Economic Development Corporation are providing the financing which will cover the purchase costs of foreign equipment and a feasibility study by the Canadian firm of Statler Hurter.

P.N. Besuki Rachmat.—This plant is located near Banyuwangi in East Java and occupies close to 50 hectares of land. The factory is an integrated pulp and paper mill that employs a sulphate process coupled with stagewise bleaching and chemical re-

Table 6.—Indonesia: Existing and Projected Capacity of Paper Mills

Name and Location of Mill	1976 Capacity ¹	Projected 1980 Capacity	Paper Products
P.N. Padalarang (Government)			
Bandung, East Java	5,000	5,400	Writing, Printing
P.N. Kertas Blabak (Government)			
Magelang, Central Java	7,200	15,000	Writing, Printing
P.N. Kertas Basuki Rachmat (Government)			
Banjuwangi, East Java	9,000	13,000	Writing, Printing, Kraft
Perum Kertas Gowa (Government)			
Gowa, South Sulawesi	15,000	15,000	Writing, Printing, Kraft
P.N. Kertas Leces (Government)			
Probolinggo, East Java	10,000	24,000	Writing, Printing
P.T. Delta Paper (Private)			
Medan, North Sumatra	1,200	1,200	Coated, Packaging Paper
P.T. Impama (Private)			
Jakarta, West Java	1,500	1,500	Toilet, Tissue Paper
P.T. Berkas Kimia Jaya (Private)			
Tangerang, West Java	4,500	4,500	Wrapping Paper
Total	52,410	73,600	

¹ Capacity in metric tons.

Source: Pulp and Paper Association of Indonesia and Directorate-General of Chemical Industries.

covery. The facility was designed for a capacity of 30 tons daily or 9,000 tons annually and will be increased to 11,000 by 1980. Originally, bamboo was the prime raw material, but since 1974 turi and pine have also been used because of the rapid depletion of the bamboo stands.

Besuki Rachmat was built with Japanese war reparation funds amounting to \$8.5 million. The principal contractor for the project was the Japanese firm, Toyo Menka Kaisha, that did the initial survey work and supplied the machinery.

P.N. Gowa.—This integrated pulp and paper plant located in Gowa, South Sulawesi, had an annual capacity in 1976 of 9,000 tons. Through rehabilitation and expansion, the Gowa plant will have a capacity of 15,000 tons annually by the end of 1980. The plant uses a mixture of bamboo, turi, pine, jabon, and mangrove wood. The sulphate process with stagewise bleaching coupled with a chemical recovery system is employed.

Gowa, like Besuki Rachmat, was built partially with Japanese war reparation funds. Construction began in 1963, but because of political problems and technical difficulties with the equipment supplied by the Japanese firm, F. Kanematsu, the plant did not reach full capacity until 1971.

In January 1975, a credit agreement was concluded between Gowa and a consortium of banking interests including BAPPINDO (the State Development Bank), Bank Dagang Nasional (the National Commercial Bank) and Bank Nasional Indonesia-1976 (the Indonesian National Bank). The agreement provided the necessary funding to finance the purchase of equipment and machinery required for expansion purposes as well as providing the mill with a unit capable of producing coated paper.

In addition to the State run mills there are four small privately owned operations producing wrapping, tissue, cigarette, carbon, and kraft paper. One privately owned plant is located near Medan, North Sumatra, while the other three are on Java. Although the four plants have a combined capacity of approximately 25,000 tons per year, they produce less than 50% of that figure.

PRINCIPAL GOVERNMENT OFFICES

All paper and pulp operations fall under the regulatory authority of the Cellulose Industrial Directorate of the Directorate-General of Chemical Industries, located at Jalan Kebon Sirih 31, Jakarta.

TRENDS, PROGRAMS, AND PROJECTS

Paper production first began in Indonesia in the 1920's, during the Dutch colonial period. During

World War II and the struggle for independence, industry management suffered and Indonesia's paper industry deteriorated badly. Four new plants were constructed in the postwar period as part of the Japanese war reparations debt, supplying, however, only a small fraction of Indonesia's requirements.

With the restoration of stability in 1967, the Government laid down specific plans to increase domestic paper production. The main objective was to become self-sufficient in paper production, thereby, drastically reducing foreign exchange expenditures on such imports. During Indonesia's first 5-year development plan, a concerted effort to rehabilitate the existing plants and, where possible, expand their production was carried out. It is envisioned that under the current development plan, the emphasis will be shifted slightly toward increasing production by replacing obsolete equipment, expanding existing facilities, and adapting more sophisticated technology. The Indonesian Government long ago recognized that with Indonesia's huge forest resources there should be an abundance of raw materials for new pulp and paper facilities. The Government has further recognized that the huge capital expenditures required for the construction of such facilities (anywhere from \$90 to \$400 million depending on size) were beyond the capabilities of local private investors. It was decided that the pulp and paper sector of the economy was an area where foreign investment would be encouraged.

As of December 1975, the Indonesian Government has approved 2 foreign and 20 domestically financed pulp and paper projects totaling \$131 million. Most of the projects will involve the construction of limited capacity mills with annual outputs in the range of between 15,000–60,000 MT (see table 7), relying on imported wood pulp as a raw material. These facilities, when built, will supply only a small fraction of Indonesia's annual paper needs. Since neither these mills nor those currently operating will produce enough paper to meet demands, the Government is examining a number of proposals for the construction of large integrated pulp and paper mills located, for the most part, in the Outer Islands.

The estimated cost of building a plant in Indonesia capable of producing 170 tons of paper and 150 tons of pulp daily varies from \$125 million to \$250 million. This large amount is considered beyond the financial capabilities of the Indonesian private sector, and relatively risky by foreign investment standards, considering the long-term commitment involved. In addition, because of the underdeveloped condition of most of Indonesia's transportation system, additional costs would be entailed in the construction of necessary roads and port facilities required for each plant. Finally, the ques-

Table 7.—Indonesia: Pulp and Paper Mill Projects

Name and Location	Product	Raw Material	Annual Capacity ¹
P.T. Anem Kosong Anem Central Java	Newsprint	Pine	60
P.T. Sumbra Indra Jaya Lyun, Aceh	Corrugated board and wrapping paper	Mangrove, rice stalks and bagasse	4
M/S Ballapur Paper and Show Board Mill, Ltd. East Java	Pulp for writing, Kraft	Pine	12
P.T. West Java Pulp and Paper Industry Bekasi, West Java	Wood-free pulp	Waste paper and waste cotton	12
P.T. Asasi National Development and Industry Siantar, North Sumatra	Writing and printing paper, Kraft	Waste paper and pine	30
P.T. Kimberly Clarke and P.T. Darfin Bekasi, West Java	Cigarette paper and bleached pulp	Pine, waste paper, and imported pulp	7
P.T. Kayan River East Kalimantan	Pulp	Mixed tropical species	200
P.T. Alas Helau Aceh	Chemical pulp and sack paper	Pine	600
P.T. Sopramar	Chemical pulp	Mixed tropical species	200

¹ Capacity in thousands of metric tons.

Source: Directorate-General of Chemical Industries.

tion arises as to whether there is a sufficient quality of the right type of raw materials to sustain production over a number of years. Although Indonesia is blessed with large virgin forests, the prevalence of short-fiber tree species found in such areas as Kalimantan and Irian Jaya are not suitable for most pulp and paper production, therefore, limiting both the type and quality of paper that can be produced.

Investigations indicate that the application of clear-cutting techniques and a plantation system of forest management are essential if the optimal benefits are to be derived from Indonesia's pulp and paper potential. Plantations could show an incremental annual growth of 21 cubic meters to as much as 49 cubic meters per hectare in contrast to the mean annual growth of 7 cubic meters per hectare of the natural tropical forest. In addition, a selected number of species could be grown in a plantation which will display optimum growth rates, yield, properties and quality of finished product. A properly managed plantation would not only stabilize the soil and prevent erosion, but is also younger, more vigorous and resistant to insects and disease than the natural forest stand. Forest plantations would also ensure Indonesia a renewable resource and provide continuing employment for the local inhabitants in the development of a permanent cash earning crop.

Other raw materials are also being considered for paper production in Indonesia. Experiments being conducted by the Leces paper and pulp mill in Probolinggo, East Java, using bagasse as a raw material have shown great promise. If good quality newsprint can be made from bagasse, it will go a long way toward satisfying Indonesia's demand for newsprint. The initial experiments have found that

through a combination of various processes, newsprint can be produced from cane bagasse in Indonesia on an economically sound basis. It is hoped that when most of the sugar mills in East Java convert from using bagasse to oil for heating their boilers in the 1980's, a sufficient supply of bagasse will be available for paper production.

Three major ventures for pulp and paper production are under active construction by both local and foreign business interests.

P.T. Kayan River.—The Philippine lumber producer is required by its license to construct and operate a 200,000-ton-a-year pulp and paper mill on its million-hectare concession near Samarinda in East Kalimantan. The company has applied to establish a plant that will produce newsprint, writing, printing, and corrugated paper at a cost estimated in excess of \$250 million. The raw materials would be tropical hardwoods from its own concession. However, Kayan River has applied for a postponement of construction on the grounds that market conditions are currently unfavorable. The plant was originally expected to be in operation by 1987. Kayan River will be under pressure to either build the plant or to relinquish part of its 1 million-hectare concession to the Government as provided in the firm's forestry agreement. Such factors as the availability of finance, the price of both logs and sawnwood and whether or not the company's new sawmill is an economic success will most likely affect the firm's decision to proceed with the construction of the pulp and paper mill.

P.T. Alas Helau.—This venture organized by two prominent Indonesian businessmen, is attempting to

develop a pulp and paper mill on a 400,000-hectare concession in Aceh province. The management is seeking a relationship with a foreign investor, and prefers an association along the lines of a production-sharing agreement rather than a joint venture. The firm began a planting program in the mid-1970's to assure an adequate supply of raw materials for the planned pulp and paper mill. Of the 400,000 hectares in the concession, only 70,000 are thickly wooded. Preliminary plans are for a first phase mill production of 500 tons-per-day capacity, requiring 800,000 cubic meters of wood a year. The second phase would double capacity. The management plans to provide 100,000–200,000 tons per day of this output for domestic markets leaving the rest for export. The mill would produce bridgecraft chemical pulp and sack paper. The total project's costs are expected to run about \$100 million.

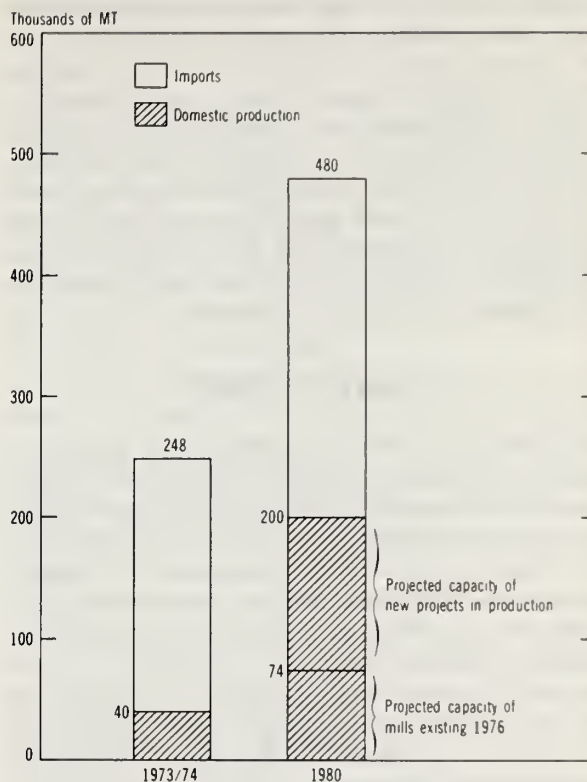
P.T. Sopramar.—This French-Indonesian joint venture, holds no concession of its own, but is planning to process pulp from hardwood forests of 12 concessions owned by others in Central and South Kalimantan. The Government Directorate-General of Forestry is arranging these concessions into a quasi-consortium whose special mandate will include clear cutting. Sopramar proposes to produce 200,000 cubic meters of pulp annually for the domestic and international market at a cost of approximately \$250 million. Production is expected to begin by late 1982.

The Sopramar partners include Dharma Diaka, Societe de Gestion et des Entreprises, Cellulose du Pin, and Bangué Rothschild. No decisions have yet been made on the equipment that will be used for the project.

INDUSTRY GROWTH PROSPECTS

Indonesian paper production grew at an average annual rate of over 20% during the 1970–75 period, higher than the figure planned by the Government for the first 5-year development plan. Paper consumption for the same period grew at 18% annually, necessitating an 80% increase in paper imports. The Government has set a growth rate of 38% per annum for the industry during the second national plan period. On the basis of both the Government's plans to expand its facilities and the expectation that several of the privately financed pulp and paper mills will be on stream by 1980, the Government's targets for Repelita II could be achieved by 1980 (see figure 1). If consumption increases are held at a rate of no more than 12% per year, as projected by government planners, imported paper will be about 280,000 metric tons in 1980.

Figure 1.—Indonesia: Paper consumption End of Repelita I (1973/74) and 1980



Source: Official and Trade Association Statistics, and estimates based on trade source interviews

It is unlikely that self-sufficiency in paper production can be achieved in the near future as has been suggested by some planners in Indonesia. It is even more unlikely that Indonesia will be able to export newsprint, kraft, or writing paper, since domestic requirements will begin to increase even faster as the Indonesian economy expands and develops. Only an infusion of large investments earmarked for the construction of integrated pulp and paper mills and the development of well-managed forest plantations would have the effect of appreciably reducing Indonesia's imports of paper.

There seems to be a lack of familiarity in Indonesia with the financial and technological problem associated with establishing a large integrated pulp and paper operation. The assumption is widely held that because of the existence of huge stands of virgin forests in Indonesia, a pulp and paper industry can be established fairly rapidly. There is little cognizance of the fact that clear cutting followed by reforestation or plantations may be the most economic approach to developing a large scale paper industry.

Not all trees are suitable for pulping purposes, of course, and mixed forests, in spite of their extent, may not be the most economic pulp source. In Indonesia it requires from 12 to 16 years from the time new seedlings are planted, until they are ready for harvest. Throughout this gestation period, proper management techniques are needed to ensure that the trees receive adequate care. Most foreign investors in Indonesia have taken a long-range approach in their investment proposals, beginning with logging, and followed by the downstream operations of sawmilling, plywood, and chipmill factories, development of pulp wood plantations and the ultimate establishment of a paper mill. This is expected to be the approach which will lead to a financially viable pulp and paper industry in Indonesia.

MARKET SIZE

In 1976, the total market for pulp and paper production equipment and pulp and paper mill equipment amounted to \$7.6 million (see table 8). On the basis of an evaluation of market data, historical trends, and interviews with government and industry representatives, the total market is projected to grow at an average annual rate of 30.5% reaching \$29 million by 1980.

There is no domestic manufacturing of pulp and paper production equipment or pulp and paper mill equipment in Indonesia. No plans currently exist for such production. The total equipment market for this industry is supplied by imports.

Imports

Japanese and German manufacturers of pulp and paper products production equipment have continuously dominated the market. Their combined market share in 1976 amounted to more than 73%, while American suppliers accounted for less than 1% of the total.

The major suppliers of Indonesia's pulp and paper mill machinery market have been Japan and Taiwan, each having about 30% of the \$1.9 million value of this market in 1975. The U.S. market share has been around 10% in recent years but it was estimated at 34%, over \$1.3 million, of Indonesia's nearly \$4 million market for pulp and paper mill machinery in 1976. The reasons for this are sales of several big ticket pieces of specialized equipment to State mills. The U.S. share of this market is expected to remain over 10% during the next few years.

Taiwan is expected to increase its share of the Indonesian market considerably in future years. This will be the result of sales to small, privately owned mills at low prices and the favorable financing terms being offered by Taiwanese suppliers.

Table 8.—Indonesia: Pulp and Paper Manufacturing Equipment Imports
(in thousands of U.S. dollars)

	1973	1974	1975	1976	1980
Pulp and Paper					
Production Equipment					
United States	193	31	17	30	200
Japan	70	2,237	2,348	—	—
West Germany	347	690	1,111	—	—
Taiwan	220	197	108	—	—
China	77	119	149	—	—
Hong Kong	13	29	49	—	—
Sweden	22	19	156	—	—
United Kingdom	—	35	121	—	—
Switzerland	—	5	16	—	—
Others	72	46	59	—	—
Total	1,014	3,048	3,016	3,690	6,260
Pulp and Paper Mill Machinery					
United States	17	—	—	1,350	3,100
Japan	229	798	670	—	—
West Germany	82	80	283	—	—
Taiwan	136	227	536	—	—
Australia	4	—	15	—	—
United Kingdom	24	13	—	—	—
Sweden	2	2	1	—	—
Netherlands	3	8	368	—	—
Others	16	67	19	—	—
Total	520	1,177	1,892	3,990	22,830
Total Market Size ..	1,534	4,585	4,908	7,680	29,090

Sources: Official statistics and estimates based on trade source interviews.

MARKET OPPORTUNITIES

Since Indonesia plans to become self-sufficient in paper production and to produce enough pulp for both domestic needs and export, excellent opportunities should exist for the sales of all types of equipment and machinery to the Indonesian pulp and paper industry.

Both new and used pulp and paper machines are expected to be purchased as the expansion and rehabilitation of existing plants proceeds. Specific equipment needs include headboxes, fourdriniers, presses, dryers, calendars, reels, winders, vacuum systems, pulpers, and processing instrumentation. A number of the new, privately owned paper mills which are being planned will require machines for producing such specialty paper products as cigarette paper, cups, boxes, and paper tubing. Since Indonesia is becoming more concerned with the dangers of water pollution, particularly in those areas adjacent to agricultural lands and fisheries, there should be a growing need for processes and equipment for recycling pollutants and processing of effluents.

All plants will require chemicals for use in the various stages of processing. Although some of these chemicals can be produced locally, others must be imported. The Leces mill, which produces 15,000 metric tons of paper annually from rice stalks, imports 2,500 metric tons of caustic soda, 600 metric tons of bleaching powder, and 150 metric tons of

kaolin. The Basuki Rachmat and Gowa mills which use various wood combinations of pine, turi, and bamboo as raw material require 545 metric tons of salt cake, 545 metric tons of sodium sulfide, and about 1,830 metric tons of kaolin. There will be a continued requirement for pulp by most government and private factories, imports of pulp and other papermaking materials were 40,000 metric tons in 1975, valued at \$5 million.

A continuing need exists for consultants who can assist local Indonesian interests in analyzing and determining the feasibility of investing in the construction of pulp and paper facilities. Firms interested in providing these consulting services should have strong engineering and construction credentials in the pulp and paper industry, as well as familiarity with work in tropical forests. Firms with particular expertise in the use of short fiber tropical hardwoods and cane bagasse as raw materials would have an advantage in assisting potential investors in Indonesia.

IMPORT PROCUREMENT

Buyers Universe

There are two main buying groups for equipment for pulp and paper production in Indonesia, each requiring a somewhat different selling approach. The first group consists of five government-owned plants. The second group consists of a small group of privately owned plants.

The government mills purchase equipment on a tender basis through a procurement office in each plant. These purchases are usually made according to government-approved plans regarding replacement, rehabilitation, expansion and construction. Such approved plans, as they pertain to the pulp and paper industry, are available from the Directorate-General of Chemical Industries in Jakarta.

Private plants purchase through their procurement offices located either at the production facility or at the firm's office in Jakarta. Foreign-owned private paper plants usually make major purchases through their home offices overseas, but purchase spare parts and minor items locally.

Consulting firms and engineers could play an important role in the development of large-scale integrated pulp and paper facilities in Indonesia by recommending particular processes, and providing guidance in the selection of machinery and equipment.

Foreign Supplier's Universe

The Indonesian pulp and paper industry is supplied by major foreign firms based mainly in Western

Europe, the United States, Taiwan, and Japan. Most equipment is exported directly from the country of manufacture to the end user. While U.S. and Western European suppliers tend to specialize in a limited line of equipment, the Japanese and Taiwanese manufacturers often make their sales on a system or "turnkey" basis through controlled trading companies.

Japanese suppliers were able to establish themselves as major suppliers in the Indonesian pulp and paper industry through the war reparations program. For example, two Indonesian mills, those of P.N. Kertas Basuki Rachmat and Gowa, as well as two additional plants no longer operating, were equipped as "turnkey" projects by the Japanese, and Japanese suppliers have provided equipment for rehabilitation and expansion of the mills.

Most German and Dutch firms supplying equipment to Indonesian mills have had previous market experience in the pre-World War II period. Indonesia's familiarity with German and Dutch pulp and paper machinery has resulted in considerable equipment replacement sales by suppliers from these countries.

Taiwanese entry into this market has been a recent event, due almost entirely to marketing techniques and low prices. Prices of some Taiwanese equipment are as much as 50% below competitive lines, and companies from Taiwan have invested in and equipped several small private plants.

Although high priced, American machinery is valued in Indonesia for its high quality and technological superiority. Special pumps, such as those supplied by Nash, are sometimes especially ordered even though other plant machinery is of a different line.

Marketing Factors

Capital goods for the pulp and paper industry in Indonesia are usually supplied to end users through manufacturer's agents. As in the case of the wood processing and harvesting industry, manufacturer's agents have headquarters located in Jakarta and often have branch offices near end user's facilities. Many of the same agents who represent sawmill manufacturers also represent major suppliers of pulp and paper machinery.

Since almost all Indonesian paper mills are located in Java, machinery is usually shipped to the ports of Tanjung Priok in Jakarta or Tanjung Perak in Surabaya.

After-sales service and warranties are extremely important considerations in all sales of pulp and paper machinery, since even minor equipment failure may result in long production delays for plants located in remote areas of Indonesia.

Pulp and paper mill machinery imports are subject to a maximum duty of 20%, ad valorem, while the import duty rate on equipment for making paper products is 30%, ad valorem. Indonesian imports of pulp are subject to a combined duty and sales tax of 15%, ad valorem.

The Indonesian Pulp and Paper Association (c/o P.T. Anam Kosong Anam, A.K.A. Building, Jl. Bangka II/45, Kebayoran Baru, Jakarta) is the industry trade organization which represents interests of both government and private manufacturers. The Association makes recommendations to the Government concerning policy formulation regarding pulp and paper manufacturing, and serves as the principal vehicle of communication between individual manufacturers and government officials. The Association also publishes a monthly magazine called *Berita Selulosa* (Cellulose News), which serves as the main channel of communication among its members.

Because the Indonesian pulp and paper industry is relatively small, suppliers have tailored their marketing activities to provide a concentrated and personalized sales approach to end users. By following this approach, the Indonesian representative of the U.S. firm, Dorr Oliver, for example, was recently able to sell pulp working machines to three of the government mills at a total price of \$1.2 million. Other Indonesian representatives also give the personal sales approach as the key to sales success in the pulp and paper industry.

COMPETITIVE POSITION OF U.S. SUPPLIERS

Both U.S. equipment suppliers and consultants to the pulp and paper industry are well-recognized by Indonesian end users for their leadership in the manufacture of high quality equipment, modern technology, and experience in plant design and construction methods. In many instances, however,

U.S. manufactured equipment has priced itself out of competition in terms of supplying the majority of Indonesia's current pulp and paper machinery requirements. In some cases, for example, Japanese and Taiwanese machinery is priced anywhere from 10 to 60% less than comparable American manufactured equipment. In addition, the transportation costs for shipping both products and machinery to Indonesia from the United States are considerably higher than from either Western Europe or the Far East. Another disadvantage to U.S. suppliers in this market is that they have generally not been able to compete with the more liberal sales financing terms offered by firms from the Far East and Western Europe.

Nevertheless, the growth of the Indonesian pulp and paper industry presents opportunities for sales of U.S. equipment and consulting services if firms will intensify marketing efforts. U.S. firms interested in developing sales to the Indonesian pulp and paper industry should plan frequent and extended sales trips to visit existing plants and become familiar with needs and proposed projects. Direct personal contact with plant management, potential investors, and government officials is essential to develop sales in this industry which is so effected by long-term projects.

U.S. equipment suppliers who are not yet active in the Indonesian market should give high priority to establishing strong local sales representation to make and continue the very important personal contacts with industry leaders.

While sales promotion by direct mail and advertising in such media as *Berita Selulosa* are important, probably the most effective sales promotion method to the Indonesian pulp and paper industry is through sales seminars. Such a presentation targeted at key plant managers, government officials, and investors would provide an excellent forum for presenting the firm's approach to the industry's needs for equipment, financing, management, forest planning, and plant technology.

Government, Business, and Financial Establishments

Indonesian business and office operations present a study in contrasts. Labor-intensive offices often turn out high-quality work, while apparently modern facilities sometimes function with outmoded procedures leaving expensive machinery unused.

Although the Government is a major purchaser of business equipment and systems, it has been slow to adopt modern business practices. Foreign firms and joint ventures directly exposed to international business practices are the leading users of modern business methods and machinery in Indonesia. Most of these firms have systems comparable to those of their home offices. Some large domestic firms use modern business equipment, but most smaller firms either have none or underuse what they have.

Several government programs and international aid projects focus on improving office procedures and correcting deficiencies in administrative and technical training. The lack of trained personnel will remain a problem for some time, but continuing progress is expected with the Government and business working to remedy the shortage.

Sales of business equipment and systems totaled \$23.5 million in 1975, and increased an average of 18% per year between 1973 and 1976. Equipment that simplifies procedures, reduces errors, and is easy to operate is expected to be much in demand during the next few years. Reliability, service, and provisions for training are important to prospective buyers.

U.S. equipment has a traditional reputation for excellence and U.S. suppliers are respected for their honesty, fairness, and technical and managerial expertise. Trade sources predict, however, that U.S. manufacturers will have to increase their activity and visibility in the market to maintain their strong market position.

Although the Government is directly involved in nearly every phase of the Indonesian economy, for purposes of convenience this discussion of business equipment and systems users is divided into the following categories: financial institutions, industrial and commercial establishments, government offices, data processing service centers, and educational and training institutions.

FINANCIAL INSTITUTIONS

The financial sector in Indonesia consists of government banks, private banks (domestic and foreign), nonbank financial institutions, and insurance companies. In 1974 banks and financial institutions, with 121,000 employees, accounted for 0.3% of the country's total employment. This employment is expected to rise to 157,000 by 1979, but will still account for the same share of the working force. Foreign advisors are extensively employed but their number declines each year.

Government banks

The governmental banking structure includes Bank Indonesia (BI) the central bank, five state-owned commercial banks which are licensed to handle foreign exchange banking, and 26 regional development banks. It also includes the Indonesian Overseas Bank (INDOVER) in Amsterdam, Bank Pembangunan Indonesia (BAPINDO), the state development bank, and Bank Pembangunan Negara (the state savings bank) (see table 1). Bank Indonesia and the state banks account for 90% of the total outstanding bank credit.

The central bank had its origins in the establishment of the Java Bank, a quasi-government commercial bank, in 1827. From 1942 to 1945 it functioned under the name Yokohoma Specie Bank and handled Japanese commercial banking interests. Several changes took place in the bank's structure during Indonesia's struggle for independence from the Netherlands following World War II. In 1946 the Indonesian Government designated it as the central bank. At a conference in The Hague in 1949, it was granted the sole right to issue currency for the new republic. The Bank Indonesia Act of 1953 renamed it Bank Indonesia, reaffirmed it as the central bank of the Republic, and made it the monetary authority in Indonesia.

The General Banking Act of 1967 further delineated the three functions of the central bank: To regulate and maintain the stability of the rupiah, to promote production and development in the country,

and to improve the standard of living of the Indonesian people.

The Central Banking Act of 1969 established the Monetary Board to assist the Government in the planning and determination of monetary policy. This board includes the Ministers of Finance and Economics and the Governor of the Bank Indonesia. Other ministers may serve as advisors at the discretion of the Government. Bank Indonesia also has a Board of Managing Directors which is responsible for enforcing the regulations and carrying out the directives of the Monetary Board.

Through programs sponsored by the World Bank, Bank Indonesia has been working with several consultants to improve banking and personnel procedures. No official statistics have been published by Bank Indonesia since February 1975 because of the financial difficulties of Pertamina, the state petroleum corporation. Those figures showed Bank Indonesia with assets of \$3.2 billion as of December 1974.

Indonesia's system of state commercial banks has been in operation in its present form since December 1968. All five state-owned commercial banks are licensed to handle both general and foreign exchange banking. In addition, each bank, as a result of its development prior to 1968 has a particular operational specialty such as mining or agriculture. The assets of these banks as of November 1974 totaled \$4.3 billion.

Bank Bumi Daya is the only state commercial bank which has acquired a computer system. Its computer is used only for ledger posting. Because all original transactions are handled manually the flow of information into the computer is still slow. Other banks have begun limited use of various computer services.

Bank Pembangunan Indonesia (BAPINDO, the state development bank) is the largest financial institution to specialize in medium-term credit. It deals primarily with the manufacturing sector. To increase the efficiency of its operations and to be more effective in financing the foreign exchange costs of industrial projects, it has received financial assistance from the World Bank, International Development Association.

There are regional development banks, one in each of the 26 provincial capitals. They are joint ventures between the provincial governments and private banks. They receive savings deposits, issue medium- and long-term securities, and grant medium- and long-term credits for development projects. The assets of the development banks totaled \$335 million as of November 1974.

Private banks

Private banking consists of Indonesian commer-

cial banks licensed for foreign exchange, those licensed for domestic banking only, branch offices of foreign banks, and representative offices of foreign banks. In 1976 there were six private Indonesian banks licensed to handle foreign exchange transactions, including the financing of trade and direct dealings with foreign banks. Private banks are required to have a minimum capitalization of \$1.2 million to qualify for a foreign exchange license.

Banking Industry, Financial Condition

(in millions of US\$)

	1973	1972	1st 6 months 1974
Domestic Foreign Exchange Banks			
<i>State-Owned Banks</i>			
Total Assets	\$2,668	\$1,700	\$3,759
Cash and Balances With Banks	303	205	456
Loans and Advances	1,631	1,005	2,137
Liquid Assets	367	266	511
Earning Assets	2,181	1,362	2,967
Deposits	1,576	870	2,104
Net Worth	84	53	99
<i>National Private Banks</i>			
Total Assets	136	64	146
Cash and Balances With Banks	14	5	16
Loans and Advances	40	25	43
Liquid Assets	14	5	17
Earning Assets	86	49	106
Deposits	41	23	55
Net Worth	9	6	9
All Domestic Foreign Exchange Banks			
Total Assets	2,804	1,765	3,905
Cash and Balances With Banks	317	211	472
Loans and Advances	1,671	1,030	2,181
Liquid Assets	381	271	528
Earning Assets	2,267	1,412	3,073
Deposits	1,617	894	2,160
Net Worth	93	60	109
Branches of Foreign Banks			
Total Assets	584	340	660
Cash and Balances With Banks	107	75	146
Loans and Advances	217	114	260
Liquid Assets	107	75	146
Earning Assets	408	220	408
Deposits	304	178	393
Net Worth	15	12	29
Selected Domestic Non-Foreign Exchange Banks			
Total Assets	113	73	137
Cash and Balances With Banks	21	13	26
Loans and Advances	64	40	78
Liquid Assets	22	13	29
Earning Assets	65	40	81
Deposits	64	41	81
Net Worth	19	11	27
All Commercial Banks			
Total Assets	3,502	2,178	4,704
Cash and Balances With Banks	445	300	645
Loans and Advances	1,953	1,185	2,520
Liquid Assets	511	360	704
Earning Assets	2,741	1,673	3,563
Deposits	1,987	1,113	2,634
Net Worth	128	83	166

Sources: Central Bureau of Statistics, Bank Indonesia, Department of Finance.

Table 1.—Indonesia: Banking Institutions*

Name	Particulars	Name	Particulars	Name	Particulars
Central Bank Bank Indonesia 2, Jl. M.H. Thamrin Jakarta	29 branch offices and representatives in Kuala Lumpur, London, New York, Singapore, and Tokyo. Central and circulation bank holder of foreign reserves. Can make loans to the Government.	P.T. Bank Bali 24, Jl. Pasar Pagi Jakarta	3 branch offices. General banking. Can finance trade and work with foreign banks.	P.T. Indo Commercial Bank 87-B, Pintu Besar Selatan, Jakarta	4 branch offices, domestic general banking.
Commercial Banks— State Owned		P.T. Pan Indonesia Bank, Ltd. 52, Jl. Kopi Jakarta	9 branch offices. General banking. Can finance trade and work with foreign banks.	P.T. Bank Kalimantan G-3, Jl. Jos Sudarso Samarinda	2 branch offices, domestic general banking.
Bank Bumi Daya 66, Jl. Kebon Sirih Jakarta	70 branch offices and representatives in Hong Kong, Amsterdam, and Singapore. General Banking. Specializes in financing mines, plantations and the production of export items. Authorized capitalization: \$700,000.	P.T. Bank Pacific 5, Jl. Asemka Jakarta Kota	5 branch offices. General banking. Can finance trade and work with foreign banks.	P.T. Bank Masyarakat 15, Jl. Nusantara Ujung Pandang	6 branch offices, domestic general banking.
Bank Rakyat Indonesia 8, Jl. Veteran Jakarta	13 regional offices and 210 branches. Specializes in rural activities such as agriculture and animal husbandry, plus commercial and international banking. Authorization capitalization: \$700,000.	P.T. Bank Niaga 3, Jl. Roa Malaka Selatan, Jakarta	General banking. Received license in 1976 to finance trade and work with foreign banks.	P.T. Bank Nasional 79, Jl. Jenderal A. Yani, Bukitittinggi	4 branch offices, domestic general banking.
Bank Negara Indonesia 1, Jl. Lada Jakarta	11 regional offices, 202 branches and representatives in Hong Kong, Singapore, Tokyo, New York, and London. General banking plus rural, industrial, transportation, and production of export products. Authorized capitalization: \$1.2 million.	Overseas Bank Indonesia Overseas Bank (INDOVER) Manila	Owned by BI and the State Banks. International banking activity on behalf of the central and state banks.	P.T. Bank Niaga 21, Jl. Roa Malak Utara Jakarta	4 branch offices, domestic general banking.
Bank Dagang Negara 5, J. M.H. Thamrin Jakarta	7 regional offices and 59 branch offices. General banking plus mining and production of export items. Authorized capitalization: \$600,000.	State Savings Bank Bank Pembagunan Negara Jakarta	State savings bank, in the process of change-over from mortgage bank.	P.T. Bank Nisp (Bank Nilai Intl Sari Pinjaman) 25, Jl. Taman- cibeunying Selatan Jakarta	2 branch offices, domestic general banking.
Bank Ekspor Impor Indonesia 1, Jl. Lapangan Stasion Jakarta	42 branch offices. Specializes in export financing, and import and other foreign exchange transactions. Authorized capitalization: \$500,000.	State Development Bank Bank Pembangunan Indonesia (BAPINDO) 2-4 Jl. Gondangdia Lama, Jakarta	18 branch offices. Finances commercial ventures with long- and short-term loans.	P.T. Bank Pasific 5, Jl. Asemka Jakarta	3 branch offices, domestic general banking.
Commercial Banks— Private ^{1 2}		Provincial Develop- ment Bank Bank Pembangunan (BPD)	Each provincial capital, some have branches in major provincial towns. Primary activity, domestic financing at local level.	P.T. Bank Patriot 45-46 Jl. Pintu Kecil Jakarta	3 branch offices, domestic general banking.
P.T. Bank Degang Indonesia 2A, Jl. Balal Kota Medan	4 branch offices. General banking. Can finance trade and work with foreign banks.	Leading Commercial Banks—Private ³ P.T. Bank Amerta 18, Jl. Kwitang Jakarta	6 branch offices, domestic general banking.	P.T. Bank Pegawai 58, Jl. K.H. Fachruddin Jakarta	6 branch offices, domestic general banking.
P.T. Unum Nasional 34, Jl. Pintu Kecil Jakarta	3 branch offices. General banking. Can finance trade and work with foreign banks.	P.T. Bank Antar Indonesia 4, Jl. Siau Ujung Pandang	3 branch offices, domestic general banking.	P.T. Bank Pegawai Dan Pensiunan Militer (Bapemil) 1, Jl. Cikapundung Timur Bandung	4 branch offices, domestic general banking.
		P.T. Bank Antar Daerah 174 Jl. Kembang Jepun Surabaya	2 branch offices, domestic general banking.	P.T. Bank Pelita 89-91, Jl. Pintu Besar Selatan, Jakarta	2 branch offices, domestic general banking.
		P.T. Bank Buana Indonesia 34-35 Jl. Asemka Jakarta	4 branch offices, domestic general banking.	P.T. Bank Perkembangan Ekonomi Indonesia 168, C. Jl. Asemka Jakarta	3 branch offices, domestic general banking.
		P.T. Bank Gemari 1, Jl. Roa Malaka Selatan, Jakarta	5 branch offices, domestic general banking.	P.T. Bank Permata Sarl 50, Jl. Abdul Muls Jakarta	3 branch offices.
				P.T. Bank Perniagaan Unum 14, Jl. Hasanuddin Denpasar	3 branch offices, domestic general banking.
				P.T. Bank Persatuan Nasional 5, Jl. Malak Jakarta	5 branch offices, domestic general banking.
				P.T. Bank Rakyat Sulawesi 236, Jl. Nusantara Ujungpandang	2 branch offices, domestic general banking.

See footnotes at end of table.

Table 1.—Indonesia: Banking Institutions*

Name	Particulars	Name	Particulars	Name	Particulars
P.T. Bank Rakyat Tonsea Airmadidi	6 branch offices.	<i>Foreign—Domestic Joint Venture Bank</i>		Banque National De Paris	France.
P.T. Sedjahtera Bank Umum 15, Jl. Tiang Bendera Jakarta	3 branch offices, do- mestic general bank- ing.	P.T. Bank Perdanía 7-9 Jl. Mangga Besar Jakarta	1 branch office, joint venture with Daiwa Bank Ltd. of Japan.	Jl. H. Agus Salin 103 P.O. Box 160/JKT Jakarta	
P.T. Bank Semarang 21, Jl. Gg. Tengah Semarang	2 branch offices, do- mestic general bank- ing.	<i>Foreign Banks— Representative Offices</i>		Barclays Bank Inter- national Ltd. Nusantara Building 24th Floor Jl. M.H. Thamrin 59 Jakarta	United Kingdom.
P.T. South East Asia Bank Ltd. 17, Jl. Asemka Jakarta	2 branch offices, do- mestic general bank- ing.	Bankers Trust Company Nusantara Building 7th Floor Jl. M.H. Thamrin 59 Jakarta	United States.	Chemical Bank Hotel Indonesia Suite 240 Jl. M.H. Thamrin Tromol Pos 3356/JKT Jakarta	United States.
P.T. Bank Sukapura 6, Jl. Semanudi Jakarta	2 branch offices.	Bankhaus Ludwig & Co. Grindlays Bank Ltd. BDN Building, 2d floor Jl. M.H. Thamrin 5 P.O. Box 2935 Jakarta	West Germany and England.	Continental Illinois National Bank & Trust Company of Chicago BDN Building, 9th Flr. Jl. M.H. Thamrin 5 P.O. Box 2094/JKT Jakarta	United States.
Foreign Banks		Bank of India BDN Building, 8th floor Jl. M.H. Thamrin 5 Tromol Pos 3003 Jakarta	India.	The Dai-ichi Kangyo Bank Ltd. Nusantara Building 14th Floor Jl. M.H. Thamrin 59 Jakarta	Japan.
American Express International Banking Corporation Asoka Hotel Building Jl. M.H. Thamrin Jakarta	United States.	Bank of Montreal Jl. Cikini Raya (Pav.) Jakarta	Canada.	The First National Bank of Chicago Borobudur Offices 2d Floor Jl. Lapangan Banteng Selatan, Jakarta	United States.
Bank of America NT & SA 21, Jl. Merdeka Utara Jakarta	United States, 1 branch.	Bank of New South Wales Bangkok Banks Ltd. Bldg. 5th floor Jl. M.H. Thamrin 3 P.O. Box 3118/JKT Jakarta	Australia.	The Fuji Bank Ltd. Nusantara Building 17th floor Jl. M.H. Thamrin 59 P.O. Box 2519/JKT Jakarta	Japan.
First National City Bank 55, Jl. M.H. Thamrin Jakarta	United States, 1 branch.	Bank of Nova Scotia Nusantara Building 14th Floor Jl. M.H. Thamrin 59 Jakarta	Canada.	Habib Bank Ltd. Ramayana Arcade Hotel Indonesia Jl. M.H. Thamrin P.O. Box 3406/JKT Jakarta	Pakistan.
The Chase Manhattan Bank NA. 6, Jl. Merdeka Barat Jakarta	United States, 1 branch.	Banque De L'Indochine BDN Building, 11th Floor Jl. M.H. Thamrin 5 P.O. Box 2442/JKT Jakarta	France.	Indonesische Over- zeese Bank (De) NV. Hotel Asoka 2d Floor Jl. M.H. Thamrin Jakarta	The Netherlands.
Europaesch Asiatische Bank Wisma Nusantara Build, Jl. M.H. Thamrin Jakarta	West Germany.	Banque De L'Union Europeene Jl. Matraman Raya 28 P.O. Box 2701 Jakarta	France.	Korea Exchange Bank BDN Building 6th floor Jl. M.H. Thamrin 5 P.O. Box 2317 Jakarta	Republic of Korea.
The Chartered Bank 40, Jl. Abdul Muis Jakarta	United Kingdom.	Banque De Paris Et Des Pays-Bas Borobudur Offices, 3d Floor Office No. 15 & 16 Jl. Lapangan Banteng Selatan, Jakarta	France.		
Algemeine Bank Nederland NV. 25, Jl. Ir. H. Juanda Jakarta	The Netherlands, 1 branch.				
The Bank of Tokyo Ltd. Wisma Nusantara Build. Jl. M.H. Thamrin Jakarta	Japan, 1 branch.				
Bangkok Bank Ltd. 3, Jl. M.H. Thamrin Jakarta	Thailand.				
The Hong Kong & Shanghai Banking Corp. 18, Jl. Gajah Mada Jakarta	United Kingdom, 1 branch.				

See footnotes at end of table.

Table 1.—Indonesia: Banking Institutions—Continued

Name	Particulars	Name	Particulars	Name	Particulars
Manufacturers Hanover Trust Co. Nusantara Building 24th Floor Jl. M.H. Thamrin 59 Jakarta	United States.	The National Bank of Australasia Ltd. Borobudur Offices 2d Floor Jl. Lapangan Banteng Selatan Jakarta	Australia.	Societe Generale Euras Building Sixth Floor Jl. Imam Bonjol 80 Jakarta	France.
Marine Midland Bank Nusantara Building 27th Floor Jl. M.H. Thamrin 59 P.O. Box 2680/JKT Jakarta	United States.	Philippine National Bank BDN Building 2d floor Jl. M.H. Thamrin 5 P.O. Box 3295/JKT Jakarta	Philippines.	The Sumitomo Bank Ltd. Nusantara Building Ninth Floor Jl. M.H. Thamrin 59 Jakarta	Japan.
The Mitsubishi Bank Nusantara Building 19th Floor Jl. M.H. Thamrin 59 Jakarta	Japan.	Pierson, Heldring & Pierson Euras Building 5th Floor Jl. Imam Bonjol 80 P.O. Box 2196/JKT Jakarta	The Netherlands.	The Tokai Bank Ltd. Nusantara Building Eighth Floor Jl. M.H. Thamrin 59 Jakarta	Japan.
The Mitsui Bank Nusantara Building 15th Floor Jl. M.H. Thamrin 59 Jakarta	Japan.	Private Investment Co. for Asia (PICA) S.A. Jl. Abdul Muis 34 Denmark House, 2d Floor Tromol Pos 429 Jakarta	Panama.	Toronto Dominion Bank Nusantara Building, Eighth Floor Jl. M.H. Thamrin 59 Jakarta	Canada.
M.M. Warburg- Brinckmann, Wirtz & Co. Jl. Prof. Moh. Yamin S.H. 59 P.O. Box 3253/JKT Jakarta	Germany.	The Sanwa Bank Ltd. Nusantara Building Third Floor Jl. M.H. Thamrin 59 Tromol Pos 3332/JKT Jakarta	Japan.	United California Bank Bangkok Bank Building Jl. M.H. Thamrin 3 Tromol Pos 3449/JKT Jakarta	United States.

¹ Authorized to handle foreign exchange transactions.

² Required minimum capitalization \$1.2 million.

³ Not authorized to handle foreign exchange transactions.

Source: Central Bureau of Statistics, Department of Trade, and industry sources.

In 1975 there were 102 private commercial banks licensed for domestic banking only, down 17 from 1973. These banks are located throughout Indonesia. They vary in size from multibranch institutions with substantial assets to some which exist only on paper. The Government is urging the smaller private banks to consolidate in order to improve their financial position and operating efficiency. Over 9,000 village, farmer cooperative, savings, and labor organization banks also are established in the country but their assets are insignificant.

In 1976, 10 branch offices of foreign banks were licensed to conduct business in Indonesia, plus one foreign bank, P.T. Bank Perdanania, licensed as a joint venture with Daiwa Bank Ltd. of Japan. Foreign banks grew rapidly in the early 1970's. By 1976 they played a more significant role in the economy than the Indonesian private banks. The liquid assets of the foreign branch banks as of September 1974 totaled \$64 million, but they have grown considerably since that time.

The activities of foreign banks are regulated by the General Banking Act of 1967, the Government Reg-

ulations of 1968, and the Decision of the Minister of Finance of 1968. Foreign banks must be located in Jakarta, may not accept savings deposits, and must limit their business to commercial banking. Laws also regulate their hiring and training of Indonesian nationals, the transfer of profits and dividends, the participation in development projects, and the repatriation of capital. Although theoretically new banks can apply for licenses to operate in Indonesia, recent government policy has limited the number of foreign banks to those currently in operation.

The Bank of America began operations in Indonesia in 1968. Although it offers direct customer banking services such as checking accounts, primarily only loans of from \$500,000 to \$1 million are handled. The bank employs 171 persons in its two branches and does all of its own training including typing instruction. Although the Bank of America is one of the best equipped banks in Indonesia, it began operations with a large proportion of used office machinery, much of which is still in use. Banking equipment now includes a Bradma check printer, two NCR proof machines, four NCR bookkeeping

machines, and three Burroughs check printers. In December 1976 a new IBM-32 series computer was being installed. To use this system, 10 new employees were hired and sent to the United States for 6 months' training. Another foreign bank, the Chase Manhattan Bank, N.A., also purchased an IBM-32 series computer in 1976.

In addition to foreign bank branches there were 34 representative offices of foreign banks in Jakarta in 1976.

Nonbank financial institutions

In order to stimulate the development of the securities and money market and a better system of investment finance, the Government established the Agency for Money and Capital Market Development in 1972. Between 1973 and 1974, eight Investment Finance Corporations (IFC's), were formed under the auspices of the agency (see table 2). In order to protect the domestic financial sector, strict regulations were established to control operations of these corporations. Foreign institutions are required to form joint ventures with established local banks, foreign partners must be from at least three different countries, control of equity capital and management must be transferred to Indonesians within 10 years, and deposits may not be accepted from the public. Bank Indonesia has ruled that these investment finance corporations may fulfill the requirement for domestic equity participation in foreign joint ventures by holding shares in trust for future sale to qualified Indonesian purchasers. It is expected that this will play an important role in assisting foreign investors to meet legal requirements for ownership.

In 1976 the investment finance corporations were primarily dealing in short-term commercial paper and real estate transactions, and served as agents for their parent banks in arranging foreign currency loans for clients. It should be noted that thus far these nonbank financial institutions are mainly involved in investment financing and that only slight progress has been made in the creation of either money or capital markets—the principal reason for their establishment.

Licenses were granted to two development finance corporations as part of the program to expand the availability of credit to both foreign and domestic investors. P.T. Indonesian Development Finance Company (IDFC) was licensed in February 1972 as a joint venture and subsidiary of Bank Indonesia. This company provides medium- and long-term loans, and it sometimes takes equity in private projects. Its initial, authorized capitalization was \$9.6 million. P.T. Private Development Finance Company of Indonesia was licensed in 1973 as a private, foreign joint venture. It also makes medium- and

long-term loans and seeks equity investment. Initial authorized capitalization was \$6 million.

In addition the Government established P.T. Bahana in 1973 to make equity investments in small businesses and provide management assistance. At the same time P.T. Asuransi Kredit Indonesia (AS-KRINDO) was established to insure bank loans made to small businesses and thereby encourage banks to increase loans to such enterprises.

In 1973, in cooperation with the Ministry of Finance, the International Finance Corporation prepared a long-range plan for the development of the securities market. Proposals included changes in the legal structure, establishment of a new institute of accounting, more stringent auditing measures, and increased development of financial expertise. At that time the foundations were laid for reopening the former stock exchange, and for establishing rules to govern stock registration and operation of the exchange.

In 1975 the Bank Indonesia issued the following regulations for sale of shares: A firm must be located in Indonesia, be a limited liability company, (P.T.), have a minimum authorized capitalization of \$240,000, have a minimum of \$60,000 in paid-up capital, have been operating at a profit for the past 3 years, have a minimum profit of 10% of invested capital for the last year, and submit properly audited financial statements and the professional statement of an independent public accountant.

Although exchange membership is thus far minimal and the status of the exchange uncertain, several international firms had expressed interest in listing shares by 1976. Securities licensed for trade include some government and state bank bonds, and stocks of about 15 commercial, transportation, utility, and other corporations, mostly Dutch and other foreign companies.

A third type of nonbank financial institution in Indonesia consists of savings and credit organizations. The Government has established three programs to encourage savings and to increase funds available for loans. TASKA, the state insurance savings program, was established in 1973 to encourage persons of limited incomes to save and to provide them with inexpensive insurance. Deposits in TASKA simultaneously earn interest and accumulate life insurance in the name of the depositor. The program, available through all state banks, is subsidized more than 50% by Bank Indonesia. Participation is limited to Indonesian citizens and permanent residents. TABANAS, the national development savings program, is a standard passbook system available through the state banks.

Bank Indonesia originated time deposits in 1970, with certificates of deposits available for periods of

Table 2.—Indonesia: Nonbank Financial Institutions

NAME	LOCATION	MAJOR SHARE HOLDERS				PARTICULARS
		INDONESIAN		FOREIGN		
DEVELOPMENT FINANCE CORPORATIONS						
P.T. Indonesian Development Finance Co. (I.D.F.C.)	Jaya Building Jl. M.H. Thamrin Jakarta	Bank Indonesia	50%	Ned. Financier-ings Myvoor Ontwik Keling-slanden, N.V. (Den Haag)	50%	Approved Capitalization: \$9.6 million Date of License: Feb 1972
P.T. Private Development Finance Company of Indo-nesia, Ltd. (P.D.F.C.I.)	Jl. Abdul Muis No. 60 Jakarta Bea Swasta Jakarta	Bank Indonesia P.T. Gading Mas	24.6% 12.0%	I.F.C. Irvine Inter-national Finance (USA) Nippon Fudosan Bank (Japan) Others	8.0% 8.0% 8.0% 16.0%	Approved Capitalization: \$6.0 million Date of License: Aug 1973
INVESTMENT FINANCE CORPORATIONS						
P.T. Indonesian Investment International (Indovest)	Borobudur Office Jl. Lap. Banteng Selatan Jakarta	Bank Dagang Negara	25.0%	First Chicago Ltd. London (UK) Mitsubishi Bank Ltd., Tokyo (Japan) Others	35.0% 20.0% 20.0%	Approved Capitalization: \$1.2 million Date of License: Sep 1973
P.T. Merchant Investment Corporation (Merincorp)	Nusantara Building 9th floor Jl. M.H. Thamrin Jakarta	Bank Ekspor Impor Indonesia	10.0%	Morgan Guar-anty Inter-national Finance Corp., N.Y. (USA) Sumitomo Bank Ltd., Osaka (Japan) Bank Mees & Hope, Den Haag (Holland)	36.0% 34.0% 20.0%	Approved Capitalization: \$1.2 million Date of License: Oct 1973
P.T. Asian and Euro-American Capital Corporation, Ltd. (Aseam Indonesia)	Jl. Kebon Sirih 66-70 Jakarta	Bank Bumi Daya	50.0%	Goldman Sachs & Co. (USA) Dai-ichi Kangyo Bank (Japan) Union Bank of Switzerland Dresner Bank A.B. (Germany) Banque de Paris et des Pays-Bas (France) Kleinwort Benson, Ltd. (UK)	8 1/3% 8 1/3% 8 1/3% 8 1/3% 8 1/3% 8 1/3%	Approved Capitalization: \$ 7 million Date of License: Oct 1973
P.T. Inter Pacific Financial Corporation of Indonesia	Nusantara Building 4th floor Jl. M.H. Thamrin Jakarta	Bank Rakyat Indonesia	10.0%	Continental Bank S.A. Brussels (Belgium) Saiwa Bank Ltd., Osaka (Japan) Others	45.0% 41.0% 4.0%	Approved Capitalization: \$1.2 million Date of License: Nov 1973
P.T. Mutual International Finance Corporation (M.I.F.C.)	Nusantara Building 17th floor Jl. M.H. Thamrin Jakarta	P.T. Mutual Promotion Corp. Ltd. P.T. Pan Indonesian Bank Ltd.	34.5% 7.5%	Fuji Bank Schweiz A.G. (Swiss) Crocker Inter-national Development Corp. (USA) Commercial Bank of Australia Ltd. (AUS) Fuji Bank Ltd., Tokyo (Japan)	20.0% 17.0% 15.0% 6.0%	Approved Capitalization: \$1.2 million Date of License: Dec 1973

Table 2.—Indonesia: Nonbank Financial Institutions—Continued

NAME	LOCATION	MAJOR SHARE HOLDERS				PARTICULARS
		INDONESIAN		FOREIGN		
P.T. First Indonesian ¹ Finance and Investment Corporation (FICORINVEST)	Jl. Pakubuwono VI/II Kebayoran Baru Jakarta	P.T. Bina Usaha Indonesia	50.0%	Pierson, Held- ring & Pierson (Holland) Rothschild Inter-continental Bank, Ltd. (UK) Others	8.5% 7.5% 34.0%	Approved: Capitalization: \$1.2 million Date of License: Nov 1973
P.T. Financial Corporation of Indonesia (FINCONESIA)	Nusantara Bldg. 24th floor Jl. M.H. Thamrin Jakarta	BNI-46	10.0%	Nomura Securi- ties, Ltd. Tokyo (Japan) Barclays Bank International Ltd., London (UK) Manufacturers Hanover Inter- national Finance Corp., N.Y. (USA) Mitsui Bank Ltd. Tokyo (Japan) Others	19.0% 17.0% 17.0% 17.0%	Approved: Capitalization: \$7.2 million Date of License: Oct 1972
P.T. Indonesian National Investment (I.N.I.)	Bangkok Bank Building 7th floor Jl. M.H. Thamrin Jakarta	P.T. Bank Central Asia	30.0%	Jardine Fleming (Far East) Ltd. The Long Term Credit Bank of Japan Ltd. The Royal Bank of Scotland Ltd., Edinburgh (UK) Asia Insurance Co., Ltd., Hong Kong	25.0% 20.0% 15.0% 10.0%	Approved: Capitalization: \$.7 million Capitalization: \$7.2 Date of License: Jul 1973
OTHERS						
P.T. Bahana Pembinaan Usaha Indonesia	Jl. Cik Ditiro 23 Jakarta, Pusat Jakarta	Indonesian Government Bank Indonesia	80.0% 20.0%	—		Approved: Capitalization: \$4.8 million Date of License: May 1973

¹ Not in operation (1976).

Sources: Department of Finance, Central Bureau of Statistics, trade sources.

3 months to 2 years at interest rates ranging from 9% to 24%. Private banks are not allowed to participate in the state program, but they can offer short-term timed deposits. Interest rates, which have been as high as 18% per year for 6-month deposits, are competitive with both TABANAS and Government certificates.

The Government has instituted several programs to increase the availability of credit to business and farming enterprises, but the limited availability of capital has kept credit lines low and interest rates high. Moreover, it is very difficult for most firms to qualify for any loans other than the minimum amounts at the highest rates.

Two government projects, the Small Investment Credit Program and the Permanent Working Capital Credit Program, have credit ceilings of about \$12,000; a third, the Village Credit Program, has a ceiling of only \$240. In these three programs there

is less emphasis on collateral and more value placed on the economic outlook for the activity in question.

For larger loans the government-regulated interest rates begin with a prime rate of 12% and move by steps to 30%. Very few firms can qualify for prime, or close to prime, rates. The average businessman seeking a \$500,000 to \$2 million loan would probably pay 22% to 26% annual interest. Longer term loans are very scarce; the prime interest rate is 24% per year, and a firm that could not qualify for the prime rate would probably not be able to get funds at all.

Though they vary greatly in their attitudes towards transactions in the \$500,000 to \$2 million range, foreign banks often find it easier to make loans to the state banks than to go through the procedures to handle transactions of this size. Foreign banks also will arrange offshore, short-term supplier credits with rates stipulated as so many points above the Euro-

rate. Interest on these loans has usually averaged about 15%.

Insurance

There are 70 companies registered as members of Dewan Asuransi Indonesia (Insurance Council Indonesia). They include 10 life insurance companies, 45 general insurance companies, three reinsurance companies, and 12 foreign firms, with a total employment of more than 3,500 persons. The most important of these firms, all located in Jakarta, are listed below:

Insurance Companies

P.T. Buana Putra
P.T. Bumi Asih Jaya
A.J.B. Bumi Putera 1912
P.T. Jiwasraya
P.T. Pura Nusantara

General Insurance Companies

P.T. Ampuh
P.T. Bintang
P.T. "Central Asia"
P.T. Djakarta 1945
P.T. "Indonesia"
P.T. Indrapura
P.T. Murni
Periscope Insurance Co. Ltd.
N.V. Pool Asuransi Indonesia
P.T. Ramayana
P.T. Kebakaran & Umum "Suntad"
N.V. "Wuwungan"

Reinsurance Companies

P.T. Asuransi Kredit Indonesia
P.T. Maskapai Reasuransi Indonesia
P.T. Reasuransi Umum Indonesia

Foreign Companies

American International Assurance Co. Ltd.
Deltascop Insurance Co. Ltd.
P.T. Asuransi Inda Tamporok
Malayan Insurance Company Inc.
N.V. Assurantie Maatsch De Nederlanden Van 1845
New Hampshire Insurance Co. Ltd.
Semarang Sea & Fire Insurance Co. Ltd.
Taisho Marine and Fire Insurance Co. Ltd.
(General Agent)
The American Insurance Company
The London & Lancashire Insurance Company Ltd. P.T. "Independent"
The Tokio Marine and Fire Insurance Co. Ltd.
Union Insurance Society of Far East

Almost every type of insurance is available in Indonesia although the market is extremely small for some of the more specialized varieties. Most insur-

ance sales can be divided into five major categories: Life, fire, marine, accident/health, and casualty, with most casualty sales being burglary, automobile, and business liability.

Both foreign and domestic firms can offer fire, marine, accident/health, and casualty insurance. Industry sources estimate the total premium value for these types of insurance was \$100 million in 1975, divided as follows: Fire, 50%; marine, 30%; accident/health, 5%; burglary, 2.5%; automobile, 10%; and business liability, 2.5%. Based on average rates for the different types of insurance, the total policy value for these four varieties of insurance is more than \$180 billion dollars.

Only domestic and government insurance companies can offer life insurance. Because so much life insurance is purchased in conjunction with savings accounts and employer-paid benefit programs, industrywide statistics are not available.

The insurance business in Indonesia has undergone several transformations which reflect the country's history. Most foreign firms operated through agents until the late 1940's and early 1950's, when some of the larger foreign firms moved to direct representation. Firms from the Netherlands were nationalized in 1957 and 1958, those from United Kingdom in 1963, companies from the United States in 1964, and the remainder by 1965. This left only state-owned and private domestic firms still operating. Following the abortive communist coup in 1965 foreign insurance companies were invited to return.

The next policy shift occurred in 1974 when the Government encouraged foreign firms to become joint ventures and offered to permit companies complying to retain their foreign staff. In 1976 this policy became mandatory leaving those companies which had decided not to comply earlier uncertain as to their future in Indonesia.

American International Underwriters, Ltd. (AIU), Jakarta, was licensed for direct representation in Indonesia in 1970, but the company has been represented through agents there since the 1940's. AIU is primarily involved in technical underwriting and claims practice. In the first 4 years of direct representation (1970-74), business volume increased 100% per year. In both 1975 and 1976 there was a 35% increase and a 20% annual increase is estimated through the end of the current national development plan in 1979.

AIU has 56 employees including the manager and two foreign employees. Training of employees takes place on the job and includes classes in basic and business English. Equipment used by AIU consists of 3 electric typewriters, (2 Olympia and 1 Olivetti), 30 manual typewriters (Olivetti), and 30 electric calculators (12-digit Monroe, 9-digit Sanyo, and 9-digit

Sharp). Computer time is available through the AIU office in Singapore, and data are prepared by four AIU employees.

INDUSTRIAL AND COMMERCIAL ESTABLISHMENTS

In 1974 there were 28,000 registered medium-size and large manufacturing companies, with a total employment of over 1 million persons. These firms spent \$157 million on salaries, \$258 million on purchases and improvements, \$1 billion on materials, and \$157 million on rent, utilities, and maintenance (see table 3).

A useful indicator of business activity in Indonesia is the distribution of gross domestic product (GDP) by sectors of the economy. Agriculture, forestry, and fisheries accounted for 40% of the GDP in 1974, followed by wholesale and retail trade with 20%. The remaining 40% was divided among mining and quarrying with 9%; manufacturing 9%; public administration and defense 6%; and construction, services, transportation, communications, and miscellaneous with 4% each. Government planners are predicting a major change in distribution over the next few years, with the manufacturing and mining and quarrying sectors increasing significantly by 1980.

In 1974 agriculture was the largest employer (60% of all workers), followed by services (14%) and commerce (13%). Throughout the remainder of this decade, employment in the construction sector is projected to increase at the fastest average annual rate (5.5%) (see table 4).

In the Indonesian agricultural sector, the large, private and government-owned plantations and the growing cooperatives are becoming increasingly aware of the need for efficient methods of accounting and keeping records. Many wholesale and retail

Table 4.—Indonesia: Employment by Sector

	1973/74		1978/79		Average Annual Growth—%
	1,000 people	%	1,000 people	%	
Agriculture	25,342	60	26,529	56	0.9
Mining	93	—	103	—	2.2
Manufacturing	3,209	8	4,396	9	6.5
Electricity, Gas, and Water Utilities	39	—	45	—	3.0
Construction	1,032	3	1,350	3	5.5
Wholesale/Retail Trade and Hotels/Restaurants	5,236	13	6,432	13	4.2
Transport, Storage and Communication	1,045	2	1,271	3	4.0
Finance and Insurance ..	121	—	157	—	5.4
Services and Other	5,897	14	7,244	15	4.2
TOTAL	42,014	100	47,527	100	2.5

Source: Repelita II.

trade firms are beginning to purchase office machinery, but with few exceptions, do not yet know how to make the best use of modern business equipment. For example, clerks in a leading grocery chain, after ringing up sales on a new NCR cash register, then write a duplicate receipt by hand.

In the mining and petroleum sector, foreign companies dominate in exploration, drilling, and pumping. These firms are among the largest and most efficient users of modern business equipment in Indonesia.

Bechtel Incorporated of the Bechtel Group, (USA) is involved in project contracts for construction and engineering of refinery and petrochemical plants. Bechtel has five offices in Indonesia including one permanent office, three specific project offices, and one joint venture office with Pertamina, the state petroleum corporation. Its permanent office in Jakarta has 12 electric typewriters, (including 9 IBM machines of various models, 1 Olivetti, and 1 Facit), 2 Sharp hand calculators, 1 Santex desk calculator, 3 adding machines (2 Sharp, 1 Olivetti), a Xerox copier, and a telex.

Table 3.—Basic Data on Manufacturing Industries, 1973

(in millions of US\$)

Industry	No. of Establishments	No. of Employees	Wages & Salaries	Purchases & Improvements	Materials	Rent, Utilities & Maintenance
Food, beverages and tobacco	15,930	581,362	57.1	80.7	534	75
Textiles, weaving, apparel, and leather	4,645	233,258	28.8	69.3	177	18
Wood and wood products, including furniture	1,999	41,229	6.1	10.5	30	4
Paper and products for printing and publishing	782	30,880	6.4	4.7	23	6
Chemicals, chemical products, petroleum, coal, rubber and plastic wares	1,810	237,537	39.2	52.8	166	31
Other nonmetallic mineral products	1,867	41,134	4.8	12.6	8	11
Iron and steel production	—	—	—	—	—	—
Iron and steel. Machinery and equipment	1,456	58,357	13.8	27.0	59	11
Other manufacturing industries	269	15,230	0.8	0.46	3	1
TOTAL	28,758	1,228,987	157.0	258.06	1,000	157

Source: Central Bureau of Statistics.

In contrast to well-equipped corporations like Bechtel, one local electronic equipment dealer operates with 10 salesmen, two servicemen, two customer training representatives, two secretaries, and a single piece of modern office equipment, an SCM electric typewriter.

In 1973 there were 2,627 registered hotels throughout Indonesia, with only about 35 up to modern international standards. The latter figure has increased in recent years with the opening of several new hotels, including the Hyatt, the Sari Pacific, and the Borobudur (Intercontinental) in Jakarta. The Hilton and Mandarin are set to open in early 1977.

In 1976 hotel facilities exceeded demand in the major business and tourist areas of Jakarta, Surabaya, Medan, and Bali. Although the number of foreign visitors continues to increase (see table 5), many hotels are operating at below 45% capacity. Efforts are now underway to promote tourism both in the traditional tourist areas and those with tourist potential. Special attention is aimed at the United States and Japan, which already provide the largest number of tourists.

The Borobudur in Jakarta has an efficient office, including a print shop which handles all its printing needs. Its office has two IBM electric typewriters, 1 Olivetti typewriter, and 7 calculators (4 Olivetti, 2 Cito, and 1 Sanyo). Billing equipment includes 12 Olivetto adding machines, several NCR cash registers, a Xerox copier, and a NCR billing machine. The print shop contains an Addressograph-Multi-graph offset press, an A.B. Dick mimeograph, an AM exposure frame, AM vertical cameras, a Xerox copier, and paper cutters and trimmers.

Small Indonesian business firms have access to office equipment through the many business service shops in major cities. One block-long section in Jakarta has 18 shops offering copy service; two of these sell office supplies, one sells business machines and office furniture, and the others sell a wide variety of unrelated items.

GOVERNMENT OFFICES

The central government is the largest single employer. It had 533,000 employees in the early 1970's, excluding those in the armed forces and public en-

Table 5.—Indonesia: Tourists Arriving In Indonesia via Jakarta, Bali, and North Sumatra

Year	Jakarta	Bali	North Sumatra	Total
1972	129,760	47,302	16,659	193,721
1973	167,646	53,639	23,641	244,926
1974	193,614	54,170	29,778	277,562
1975	237,516	85,010	43,158	365,684

Source: Central Bureau of Statistics, trade sources.

terprises. Government departments, each headed by a Minister, include Home Affairs; Foreign Affairs; Defense and Security; Justice, Information, Finance; Trade; Agriculture; Health; Religious Affairs; Social Affairs; and Manpower, Transmigration, and Cooperatives. There are also a number of nondepartmental government agencies. The President is assisted by the State Secretariat which is headed by an official of ministerial rank. The National Development Planning Body (Bandan Perencanaan Pembangunan Nasional-Bappenas) plays a key role in development planning, coordination and implementation. There are 27 provincial governments, the former Portugese territories in Timor, Lesser Sundas became Indonesia's 27th province in 1976. Below the provincial level there were 233 regencies and 54 municipalities (2d level autonomous regions), and 3,171 subdistricts (see table 6).

Projected government expenditures during the period of the Second Five Year Development Plan provide an indication of the scope of government activity. Of planned government expenditures totaling \$12.6 billion for the 5-year period, about \$290 million is earmarked for government apparatus, and \$243 million for research and statistics; the balance being allocated for both routine and operational expenditures of the various government departments in support of programs in each sector (see table 7).

Although the Government is the largest owner of office machinery and computers in Indonesia, only a few government offices are well equipped with mod-

Table 6.—Indonesian Government Units

Province	Provincial Capital	Number of Regencies	Number of Municipalities	Number of Subdistricts
D.K.I. Jakarta	Jakarta	—	5	27
West Java	Bandung	20	4	385
Central Java	Semarang	29	6	492
D.I. Yogyakarta	Yogyakarta	4	1	74
East Java	Surabaya	29	8	544
Aceh	Banda Aceh	8	2	130
North Sumatra	Medan	11	6	177
West Sumatra	Padang	8	6	85
Riau	Pakanbaru	5	1	67
Jambi	Jambi	5	1	36
South Sumatra	Palembang	8	2	84
Bengkulu	Bengkulu	3	1	23
Lampung	Tg. Karang	3	1	61
West Kalimantan	Pontianak	6	1	108
Central Kalimantan	Palangkaraya	9	1	80
South Kalimantan	Banjarmasin	9	1	87
East Kalimantan	Samarinda	4	2	70
North Sulawesi	Manado	4	2	81
Central Sulawesi	Palu	4	—	61
South Sulawesi	Ujung Pandang	21	2	167
South East Sulawesi	Kendari	4	—	43
Bali	Denpasar	8	—	50
West Nusatenggara	Mataram	6	—	56
East Nusatenggara	Kupang	12	—	90
Maluku	Ambon	4	1	51
Irian Jaya	Jayapura	9	—	33
Total 26		233	54	3,171

Source: Central Bureau of Statistics.

Table 7.—Indonesia: Projected National Development Budget by Sectors During Repelita II (1974/75–1978/79)

(in millions of US\$)

Sector	Amount	Percent
Agriculture and irrigation	2,400	19.1
Industry and mining	446	3.5
Electricity	932	7.4
Communications and tourism	2,020	15.8
Trade and cooperatives	9	.7
Manpower and transmigration	166	1.3
Regional development	2,200	17.7
Religion	3.7	.3
Education	1,260	10.0
Health	466	3.7
Housing and water supply	234	1.9
Law and order	7.6	.6
Defense and security	302	2.4
Information	6.4	.5
Research and statistics	239	1.9
Government apparatus	290	2.3
Government investment	1,350	10.7
Total	12,600	100.0

Source: Repelita II.

ern machines and much of this equipment is underused. Since typing is not required for most clerical positions in the Indonesian Government, typewriters are often not used.

Indonesia's first computer was installed during 1956 in the Bank Indonesia. Its second computer was installed 8 years later in the office of the Adjutant General of the Army in Bandung. In 1965 two more computers were put into operation in Jakarta, one in Sarinah, the state-owned department store, and the other in the Central Bureau of Statistics (CBS). Computer purchases have continued since that time, but the lack of support services and trained personnel has seriously hampered full utilization of installed equipment. A manager and chief programmer head the 10-person CBS computer operation staff that now includes two Indonesian engineers. The CBS computer is used at only about 20% capacity. In spite of the fact that most government computers are similarly underutilized, many government departments and agencies contract work to private computer time-sharing centers.

The Central Bureau of Statistics (CBS) is one of the most efficient government operations in Indonesia. United Nations funds and consultants have provided support to CBS for several years. One foreign consultant still supervises the program, but many Indonesian personnel have been trained in recent years.

In addition to the most advanced users of business equipment such as CBS, Bank Indonesia, and the national petroleum corporation, Pertamina, several other government agencies are installing modern

business machines. The following agencies are the major users of business equipment in Indonesia: The Department of Finance (including the budget, taxation, customs, monetary affairs, and audit directorate-generals); the Department of Trade (including the foreign and domestic trade development divisions); the National Economic Development Planning Board; the Capital Investment Coordinating Board; and the Department of Information. Government educational and research organizations are also seeking methods to improve their administrative procedures and inventory control. Regional government units are similarly improving administrative and managerial efficiency through increased use of office machines.

DATA PROCESSING SERVICE CENTERS

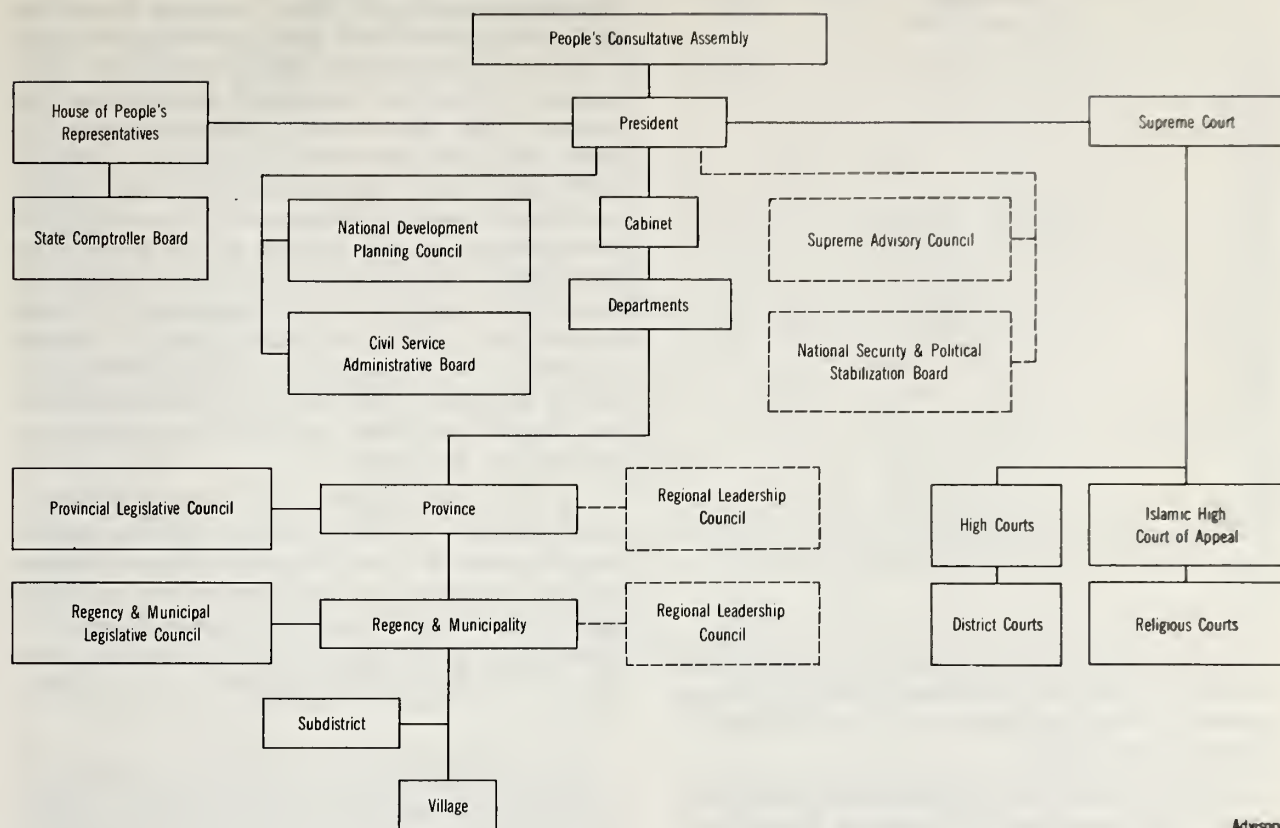
The five data processing service centers in Jakarta are P.T. Elektronika Nusantara (ELNUSA), P.T. Pansystems, P.T. IBM Indonesia, Soedarpo Corporation (UNIVAC), and N.V. MUGI (NCR Division). Pansystems also has a service center in Surabaya. An IBM 1401 data processing machine is used by the Institute of Technology at Bandung for its special research projects. In addition, the Central Bureau of Statistics and the Jakarta Municipal Government rent computer time to private companies and other government departments. Nearly all computers are operating well below capacity as owners have installed more advanced machines than are necessary for present needs.

ELNUSA, the Pertamina subsidiary which began operations in Indonesia in 1969, offers a wide range of communications and data processing services to both government and private firms. These include systems design, development, operation, and maintenance as well as training of operators for both industrial and business applications. The Indonesian oil industry relies on ELNUSA for seismic data processing, petroleum data base and engineering work, reservoir simulation, and drilling process control. Other ELNUSA data processing includes engineering computation and online teleprocessing. ELNUSA owns a Digital PDP-1140 and, in 1976, leased an IBM model 37014. ELNUSA's computer specialists have been trained in the United States.

Pansystems data processing center offers information and telecommunications systems consulting, data processing services, programming, systems analysis and design, as well as management services. Although Pansystems' IBM S/360-30 systems are not used to capacity, business was increasing in the mid-1970's.

P.T. IBM Indonesia, Soedarpo Corporation (UNIVAC), and N.V. MUGI (NCR) offer computer serv-

Figure 1.—Indonesia: Structure of Central and Local Government



Source: Area Handbook for Indonesia, DA Pam 550-39, 1975

ices through their Indonesian sales offices. Although all do payroll and banking accounts for private firms, most of their work is done for various government departments. All have available computer time and provide training both for their own personnel and for clients. One of these firms established its service and training center in order to demonstrate to potential clients that the use of computers and personnel training were practical in Indonesia.

Time sharing in Indonesia is limited to single company operations. Both Pertamina and Caltex have installed dedicated lines in order to connect several terminals to their main computers. P.T. Garuda is experimenting with a reservation terminal at the Hotel Borobudur in Jakarta. The major impediment to expansion of time sharing is the limited land-line communication system. Overcrowding of the present telephone lines prohibits use of direct lines for computer communication. Several firms are considering using the Indonesian satellite "Palapa" for improving computer time sharing, but they have found that existing land communication problems would still limit the effectiveness of this system. One firm is attempting to set up a worldwide inventory control sys-

tem and is investigating the use of microwave towers in combination with the satellite in order to bypass land communication difficulties.

The five data processing service centers supply most software. There are only a few specialized software supply firms operating in Indonesia. Overseas Management Corporation works exclusively with Pertamina. Other firms send representatives to Indonesia for limited periods of time to adapt an existing program to Indonesian laws and requirements. Most computer users work with the major suppliers to develop in-house staffs of programmers and systems analysts.

EDUCATIONAL AND TRAINING INSTITUTIONS

Educational establishments

Historically, education in Indonesia has been chiefly religious. In the mid-nineteenth century the Netherlands established secular education in Indonesia primarily to train civil servants for the colonial administrative system. Prior to World War II, schools

Table 8.—Indonesia: Teacher and Student Population by Levels

(in units of 1,000)

	1965	1970	1971	1972
<i>Preprimary</i>				
Teachers	7.3	15.0	16.7	17.0
Students	220.8	394.1	387.4	410.4
Schools	3.8	9.2	9.7	10.3
<i>Primary</i>				
Teachers	282.0	347.5	414.7	414.4
Students	11,687.3	13,395.0	13,474.7	13,121.8
Schools	51.4	65.0	65.9	66.2
<i>Secondary & General</i>				
Teachers	39.5	87.8	97.9	103.6
Students	999.4	1,260.9	1,394.5	1,440.4
<i>Vocational</i>				
Teachers	22.8	48.7	56.1	56.4
Students	393.6	544.8	589.5	594.7
<i>Teacher Training</i>				
Teachers	5.6	8.1	8.6	8.6
Students	60.7	99.4	95.0	86.4
<i>Total</i>				
Teachers	68.0	144.7	162.7	168.7
Students	1,453.8	1,905.1	2,079.1	2,121.6

Source: United Nations Educational, Scientific and Cultural Organization.

were opened to a greater number of students and broadened to provide vocational education. During Japanese occupation, education was anti-Western in its purpose and content.

In the postwar years, several attempts were made to reorganize the educational system in line with national development goals of universal and vocationally oriented education. These efforts were repeatedly hampered by political upheavals within the country, by the preference of students for general rather than practical education, and, in the 1970's, by the strain of rapidly increasing enrollment.

In 1969 the Government, in cooperation with the Ford Foundation, conducted a major evaluation of the educational system. This study revealed serious overcrowding, inadequate facilities, and untrained or undertrained teaching personnel. At least 15% of primary education teachers were found to have no professional training; another 60% had received their teacher training upon completion of the sixth grade. The Ford Foundation study made several recommendations, including reorganization of the educational structure itself. This restructuring was almost entirely completed by 1974.

The results have been encouraging. Between 1965 and 1972 enrollment increased 85% at the preprimary level while the number of schools increased 170%. Enrollment rose 12% at the primary level while the number of schools increased 29%. At the secondary level, total enrollment increased 46%. The number of years that pupils remain in school has also increased. In 1965 only 12% of primary school students went on to secondary school. This figure was up to 16% by 1972 (see table 8).

The quality of education has been improved by increasing the number of trained teachers, improving the training level of those already teaching, and providing better materials for use in the classroom. The number of available preprimary teachers has increased 132%, the number of primary teachers has grown 47%, and the number of secondary teachers, 148%. At the same time, special educational opportunities and in-service programs have been offered to those teachers already working in the schools. Intensive efforts have been made to provide educational materials for each classroom, supplementary materials for each school, and teaching aids for faculty members. With the help of the United Nations, a special program to provide 179 million textbooks and library books was launched (See chapter on Printing and Publishing).

The Government's prime educational goal is universal education. All children are to have the opportunity to receive a basic education in the primary program. Education is theoretically free and compulsory for children from 6 to 12 years of age. Fees for registration and limited facilities, however, have kept the stated goal from becoming a practical reality.

In the current national development plan, the Government reaffirmed its emphasis upon improvement of primary education with the ultimate intention of achieving universal education. The plan also calls for provision of informal basic education for children between the ages of 10 and 14 who have never attended school and providing vocational training for 15 to 24-year-olds. A general aim is improvement and expansion of education at every level. The Government also has plans to include management-level personnel from business and industry in planning school curricula so that graduates possess skills that are useful to business and industrial enterprises.

Indonesia has a 3-year preprimary program similar to the U.S. Head Start program, which educates children in basic skills; but in 1972 only 3% of primary school students had in fact had the opportunity to participate in preprimary education.

Until the early 1970's, instruction in the first three primary grades was in the regional language; the national language, Bahasa Indonesia became the language of instruction in the fourth grade. Government policy now requires the use of Bahasa Indonesia throughout the system, and all new textbooks are provided in that language.

Secondary education was extensively reorganized in 1974. The Government abandoned a five-track system in which students chose among technical, agricultural, home economic, commercial, or general education, in favor of a two-track system which offered only technical or general education. Problems

Table 9.—Number of Universities, Faculty Members, and Students: 1976

Province	Public			Private			Total		
	Schools	Faculty	Students	Schools	Faculty	Students	Schools	Faculty	Students
Aceh	1	7	2,114	1	1	38	2	8	2,152
North Sumatra	2	13	6,997	8	20	3,155	10	33	10,152
West Sumatra	2	11	4,235	2	2	314	4	13	4,549
Riau	1	6	—	2	2	180	3	8	180
Jambi	1	5	269	—	—	—	1	5	269
South Sumatra	1	7	1,722	—	—	—	1	7	1,722
Bengkulu	—	—	—	1	2	79	1	2	79
Lampung	1	6	814	—	—	—	1	6	814
Dki Jakarta	2	15	7,696	24	70	11,495	26	85	19,174
West Java	4	29	16,468	14	31	4,426	18	60	20,894
Central Java	4	21	9,582	18	52	4,205	22	73	13,787
D.I. Jogjakarta	2	23	18,398	12	29	5,305	14	52	23,703
East Java	6	35	16,708	10	27	3,347	16	62	20,055
Bali	1	10	1,804	2	2	126	3	12	1,930
West/Nusantenggara	1	4	365	—	—	—	1	4	365
East/Nusantenggara	1	4	561	—	—	—	1	4	561
West Kalimantan	1	7	1,024	—	—	—	1	7	1,024
Central Kalimantan	1	3	581	—	—	—	1	3	581
South Kalimantan	1	9	1,308	1	2	85	2	11	1,393
East Kalimantan	1	5	270	1	4	112	2	9	382
North Sulawesi	2	14	2,649	4	7	473	6	21	3,122
Central Sulawesi	—	—	—	1	2	49	1	2	49
South Sulawesi	2	14	6,923	5	9	769	7	23	7,692
South East Sulawesi	—	—	—	1	4	158	1	4	158
Maluku	1	6	1,199	1	5	102	2	11	1,301
Irian Jaya	1	5	373	—	—	—	1	5	373
TOTAL ¹	40	259	102,043	108	271	34,424	148	530	136,467

¹ Does not include: 28 Public Academies—8,522 students; 77 Private Academies—15,412 students; and 7 Higher Education on Sports—1,834 students.

Source: Department of Education and Culture.

immediately arose because, although national development goals called for an increase in the number of technically trained personnel, the overwhelming majority of the students chose general education. The secondary system is still undergoing revisions in an attempt to reconcile that conflict. The Department of Education is working closely with employers to build a program of useful vocational education.

Enrollment in higher education increased 22% during the first 5-year plan and totaled 162,235 at its completion in 1974. The second 5-year plan projects a further 22% gain. In 1976 Indonesia had 260 institutions of higher learning, including both public and private universities and academies (see table 9). Public facilities, with 29% of the total number of institutions, accounted for 75% of the students. Private schools tended to be smaller and less well equipped than the public institutions. The large public institutions offer a broad choice of education covering the sciences, engineering, education and the arts. The highly regarded *University of Indonesia* (Jakarta, enrollment 7,000) and *Gajah Mada University* (Jogjakarta, enrollment 15,000) are both beginning to attract foreign students and faculty members. Education is available through the doctoral level.

Teacher training has been an area of special concern because of the shortage of qualified personnel, particularly at the primary level. In the 1960's

teachers trained during the colonial period formed the core of the teaching profession and guided the restructuring of the system in 1974. Throughout the 1960's the number of schools training teachers increased and the scope of courses offered expanded. Greater emphasis was put on teaching methods and on specialized training such as teaching the handicapped. Teacher training institutions, however, have too often been insufficiently staffed and inadequately furnished with textbooks, libraries, or laboratories. The United Nations' UNICEF textbook project is now being applied in Indonesia, and includes provision of textbooks, instructional manuals, and library materials for teacher training institutions.

Special education programs are a fairly recent addition to the educational scene, and are still extremely limited in scope. As a result of the Ford Foundation study, personnel trained in special education increased 53% between 1970 and 1972, but the total was still only 1,258 in the latter year. Programs which were originally limited to the physically handicapped have been expanded to include visual, aural, mental, and emotional disabilities.

The Department of Education and Culture is responsible for the administration of all public schools and for the supervision of secular private schools. Religious schools are under the jurisdiction of the Department of Religious Affairs, but may be subsidized by the Department of Education and Culture

if they meet government educational standards. Most religious schools are Islamic, but there are numerous Protestant and Catholic institutions as well.

Business training institutions

Business administration, management, accounting, and related courses have been neglected in Indonesian universities. In the few schools where such courses are offered, instruction is by lecture, with minimal or no opportunities for students to gain practical experience with the use of business equipment. Furthermore, the language of instruction is Bahasa Indonesia, which does not prepare graduates for full participation in the business or scientific communities where English is now commonly used.

Computer training in Indonesia is available at the five computer time-sharing centers. Pansystems offers a computer operator training course. The only entrance requirement is the fee of \$850. The company provides employment for those who complete the course. Pansystems also offers a variety of 1- and 2-day courses on such subjects as keypunch operation.

Jakarta Tarakanita SMEA/LPK is the leading secretarial training school. All candidates must be unmarried females and have finished secondary school. The school accepts only 300 of the more than 2,000 applicants each year. By the end of the first year over half of the students regularly fail the course; 70% of the remainder pass the second year, and only 70% of these are accepted for advanced training the third year. Most equipment used by the training school is 6 to 8 years old; it includes 45 manual typewriters (Olivetti and Olympia machines were granted by the Netherlands in 1970), 5 electric typewriters (Olympia, Adler, and 3 IBM), 11 adding machines (6 Olympia, 2 Facit, a Victor, and 2 Ohdner), and a Gestetner mimeograph.

The Center for Advanced Secretarial Training was established in 1963 under the Lembaga Administrasi Negara (LAN, National Institute of Administration) to train government workers. The center opened in 1964 with 75 typewriters, both manual and electric, and a few adding machines and calculators. In 1965, the Government discontinued its direct assistance, but 2 years later it gave the center 60 additional typewriters and 30 assorted office machines. The City of Jakarta began training employees at LAN in 1969, and since then over 2,000 of its workers have received training there.

LAN now has three laboratories, two equipped with a total of 60 manual typewriters (Royal, Olympia, Olivetti, and Hermes), and one with 25 electric typewriters (Olympia and Olivetti). The center also has manual adding machines (Facit, Olivetti, Underwood, and Ohdner).

The center's 30-month training course includes

typing, shorthand, general correspondence, and basic office procedures and etiquette. One year of on-the-job experience is required between the first and second years, and another year of experience plus professional recommendations are needed to qualify for the final 6 months' course in advanced secretarial training. Only 12 persons from outside Jakarta have been allowed to attend the center, and they received 6 months' training to serve as instructors in Sumatra.

TRENDS, PROGRAMS, AND PROJECTS

The rapid development of both government and private establishment in Indonesia has greatly increased the need for efficient operating procedures and administrative expertise. In the early 1970's the extraordinary expansion of business activity and the country's exposure to international business practices was paralleled by the increasing complexity of government operations, particularly in finance, education, research, and data exchange. Government planners soon realized not only that administration was being hampered by outmoded methods, but also that effective planning of development programs was impossible without coordination of activities and assembly of information. Studies revealed a critical need for well-trained managerial and support personnel at all levels from computer programmers, accountants, and secretaries, to clerks and stock-room personnel.

During this same period purchases of business machinery began to increase rapidly. It is significant that in 1976, a single office and a single bank purchased 200 and 1,000 hand calculators, respectively. Computers were introduced in Indonesia in 1956 when a UNIVAC machine was placed in the Central Bank of Indonesia. Between 1970 and 1976, the computer population increased considerably.

Indonesia might be described as oversupplied with office equipment if judgment is based on use of machines already purchased, but Indonesian offices are undersupplied if judged in comparison with business operations in developed countries. This anomaly has forced planners to search out the basic causes of ineffective business operations. Studies reveal a great shortage of trained administrative and technical personnel, as well as serious inadequacies in basic education. Clerks were found to be unable to write letters and numbers correctly, while persons who could not handle basic addition and subtraction were attempting to operate calculators.

In consultation with foreign advisors, the Government subsequently pinpointed areas which needed special improvement to support business, government, and educational structures. It has demonstrated

a willingness to cooperate with various international agencies to develop new systems of operation. In one step toward greater efficiency in June 1973, the Government replaced the Technical Committee on Capital Investment, the Foreign Investment Board, and the Domestic Investment Board with a single organization, the Investment Coordinating Board. Several government departments are represented on the new board. Investment applicants, both foreign and domestic, now need to deal with only one agency. As of mid-1976, a number of technical assistance projects were in various stages of planning and implementation with the support of the United Nations Development Plan.

Reorganizing and strengthening the banking and financial systems are expected to remain major goals of the Government. A case in point is the Bank Rakjat Indonesia (BRI), the oldest rural bank in the country. It has been in operation since 1896, and in its present form since 1968. BRI carries out regular banking operations, acts as a banker of the Government for designated rural development projects, and has assumed responsibility for distributing short-term credits to farmers under the BIMAS (agricultural mass guidance) program. Because of its rapid expansion, BRI developed several major operational problems. The establishment of new departments led to duplication of work, procedures proved cumbersome, and personnel were distributed unevenly throughout the bank's departments. Basically manual accounting systems were outdated. Information was inadequate and difficult to obtain. Long-range planning was almost impossible to achieve. The little available equipment was often either outmoded or underused for lack of knowledgeable personnel.

In 1971 Asian Development Bank (ADB) consultants were called in to help BRI modernize its operations. The ADB program provided for adoption of sound operational systems and procedures, efficient purchase and use of equipment, and management and personnel training. The program was to be tested first in East Java, then put into effect throughout the BRI system of banks, branches, subbranches, mobile branches, and village units. The project is being supported by a \$3.4 million loan from ADB Special Fund Resources at an annual interest rate of 2.5%, with a repayment period of 25 years including a grace period of 7 years.

In addition to international assistance projects, the Government has encouraged the growth of a strong private banking sector by offering assistance such as tax incentives for banks which consolidate or merge. Private banks are also encouraged to upgrade their management by employing foreign advisors and sending employees to training courses; they are also encouraged to establish closer ties with the state and

foreign banks to increase possibilities of joint financing on selected projects.

The Government has assisted small businesses through a variety of methods, including the Investasi domestic investment program. Since 1973 Investasi has earmarked 65% of program funds for small business. P.T. Askrido, the government-controlled insurance company extended \$37 million in credits in the first quarter of 1976 to 21,673 small businesses, over and above the \$197 million distributed to 208,819 creditors between 1971 and 1975. Speaking at the 1976 Jakarta Fair, the President-Director of P.T. Askrido reported that as of March 31, 1976, only \$771,000, or 0.4% of total credits had not yet been repaid.

In addition to directly supporting business and banking, the Indonesian Government has been working with various international organizations to improve the educational system so that it can better support business growth. Programs are in operation to improve technical education at the secondary level through teacher training and office equipment purchases.

Several international aid programs are underway or being planned to upgrade the quality of management and administration in Indonesia. The World Bank is helping to improve administration in the educational field; USAID is to provide technical assistance in planning and managerial training; the International Finance Corporation has proposed a new Institute of Accounting; and a West German foundation, starting with 40 manual Olympia typewriters and training books, plans to begin a project in Bandung in 1977 to train workers for local government service.

GROWTH PROSPECTS

Several factors indicate that government, industrial, commercial, and financial activities in Indonesia will continue to expand rapidly. The steady increase in foreign investments during the First National Development Plan, and the initial years of the current plan is one important indication. The increased government support of small businesses and the success of most of these firms will encourage additional investment and expansion in the private sector. Growth in financial institutions stems from increases in the commercial and industrial sectors as well as from the spread of the money economy. In 1975, only 2% of the population in Central Java had deposits in savings accounts, but bankers predict that this percentage will rise rapidly as more Indonesians take part in the expanding money economy and banking procedures become simplified. Use of banking facil-

ities also has been shown to rise with the level of education.

As has been indicated, several international organizations are focusing their attention on training administrators and modernizing government and business structures. Such training will aid in removing many of the bureaucratic and administrative obstacles that now cause delay in such matters as gathering information to make decisions, obtaining interpretations of legal statutes, and arranging financing. At the same time, these programs to increase administrative expertise should begin to rectify the basic educational deficiencies. According to a 1975 World Bank study, the principal constraint on educational development in Indonesia is not the shortage of financial resources, but a lack of administrative capacity. In addition to planned government programs for education of young adults, many companies are implementing programs which include both technical and basic education for their workers. Several foreign and domestic firms are enthusiastic about the ability and willingness of their personnel to learn everything from handling heavy construction equipment to doing very delicate handwork. Although the present government policy of teaching technical and business subjects in the Indonesian language will continue to be a limiting factor, several company training programs and private schools are offering courses in both basic and business English.

The minimal infrastructure of all types in Indonesia—transportation, communications, electricity, etc.—will continue to restrain industrial growth. Many firms are circumventing these limitations through the use of private delivery systems, telex, and other measures.

A further hindrance to economic growth is the lack of specifications and classification standards for various statistics, sizes, and systems of operation. One of the goals of the first national development plan was to develop national standards of measurements, forms, and methods. A governmental department was formed to work toward that end. Although meetings on various standardization projects have been held and groundwork laid, implementation has been slow.

Some national development plan goals have now become government priority programs; increased efficiency at the management level, more effective basic education, higher quality technical education, and broader support of the private business sector. During the early 1970's little progress was made toward these goals because available funds were diverted to other programs. Now that improvement in these areas has been recognized as crucial to national development, steps to correct some of the root problems have been initiated.

Despite the awesome scope of many of the present

obstacles to growth, most businessmen in Indonesia agree that the combined efforts of Government and the business/financial groups augur well for business, both in the short and long term.

MARKET SIZE

All of Indonesia's business equipment is imported. Sales of business equipment and systems in Indonesia totaled \$23.5 million in 1975 (see table 10). Computer sales were the main reason for a 15% increase between 1973 and 1974 and another 21% rise during 1975. In 1976 sales growth is predicted to slow to 17% and a total value of \$27.5 million. In-

Table 10.—Size of Market for Business Equipment
(U.S. \$1,000)

	1973	1974	1975	1976
COMPUTERS AND PERIPHERALS				
United States	2,390	1,800	2,700	2,400
Japan	1,500	900	1,150	—
Italy	380	580	620	—
United Kingdom	1,140	280	860	—
Canada	—	290	180	—
France	170	250	240	—
Others	50	300	190	—
Total	5,630	4,400	5,940	5,810
TYPEWRITERS, CHECKWRITERS, ETC.				
United States	70	180	220	260
Italy	1,040	1,180	1,500	—
West Germany	100	890	1,100	—
Netherlands	240	510	620	—
Japan	270	440	530	—
Canada	110	350	420	—
Others	1,020	920	1,000	—
Total	2,850	4,470	5,390	6,460
PHOTOCOPY AND MICROFILM EQUIPMENT				
United States	210	1,200	1,370	1,500
Japan	380	2,730	3,000	—
West Germany	220	500	700	—
United Kingdom	10	40	60	—
Denmark	15	20	50	—
Sweden	10	20	40	—
Others	20	20	30	—
Total	865	4,530	5,250	5,890
ACCOUNTING AND STATISTICAL MACHINES				
United States	150	330	200	400
United Kingdom	660	560	650	—
Japan	700	310	250	—
Italy	440	500	620	—
West Germany	140	160	180	—
Singapore	80	100	100	—
Others	200	230	230	—
Total	2,370	2,190	2,230	3,970
OTHER BUSINESS EQUIPMENT				
United States	700	520	620	700
Japan	3,100	1,600	2,500	—
United Kingdom	630	870	800	—
West Germany	430	560	500	—
Netherlands	90	110	90	—
Italy	60	100	80	—
Others	190	140	180	—
Total	5,200	3,900	4,770	5,380
Total Market Size	16,915	19,490	23,580	27,510

Sources: Official Indonesian and supplier statistics, and estimates based on trade source interviews.

Indonesian purchases of office equipment are expected to exceed a \$54 million value in 1980.

The 1975 business equipment expenditures included \$5.9 million in computers and peripherals, \$5.4 million for typewriters, checkwriters, and related machinery, \$5.2 million for photocopy and microfilm equipment, \$2.2 million for accounting and statistical machines, and \$4.9 million for other business equipment.

Sales figures for computers and peripherals have fluctuated in recent years. In 1974 the worldwide recession caused computer and peripheral sales in Indonesia to decline by 22%, but sales rose by 35% in 1975. During 1976 a 2% decline in computer sales is projected. Anticipated increases in trained personnel will permit greater use of computers in government organizations and private business, and computer sales amounting to \$9.5 million are forecast for 1980.

Sales of typewriters, checkwriters and similar equipment have shown healthy increases in recent years; a 56% increase from 1973 to 1974, 21% in 1975, and 20% expected in 1976. The growth of electric supply will significantly increase purchases of electric typewriters and other electric office equipment; and sales of such items are projected to reach \$13.1 million by 1980.

Photocopy and microfilm equipment sales quadrupled between 1973 and 1974, primarily because of the popularity and proliferation of public copying shops. Sales rose another 16% in 1975, and a 12% increase is expected during 1976. By 1980 sales are projected to reach \$13.9 million.

Sales of accounting and statistical machines fell 8% between 1973 and 1974 but rose 2% in 1975. Wide use of new electronic accounting machines, and desk and hand calculators are predicted to result in a 78% increase in these sales in 1976, and by 1980 sales are projected to reach \$9.9 million.

Imports

U.S. manufacturers supplied 46% of the Indonesian demand for computers and peripherals in 1975, while Japanese firms provided 19%. The market share held by U.S. firms is expected to decrease slightly by 1980.

European companies dominate the Indonesian market for typewriters, check writers, and related equipment. Italian suppliers accounted for a 28% share in 1975, and West German manufacturers 20%. American firms supplied only 4%. European manufacturers of these items are expected to maintain their high share of the market through 1980.

In sales of photocopy equipment, Japanese manufacturers supplied 57% of demand in 1975, followed by U.S. suppliers with 26%. Over the next few years,

sales of low-cost office copying equipment to small firms is expected to enable the Japanese to increase their share of this market slightly.

In 1975 accounting and statistical machines were imported from a variety of countries. Manufacturers in the United Kingdom supplied 29%; Italy, 28%; Japan, 11%; the United States, 9%; and West Germany, 8%. Japanese suppliers are expected to increase their share considerably by 1980 as a result of competitive pricing and service factors. U.S. manufacturers should also increase sales because of their ability to offer more advanced equipment at relatively low prices.

MARKET OPPORTUNITIES

Because Indonesia has a very limited supply of trained personnel to support its rapidly expanding business activity, business equipment that simplifies procedures and reduces errors is expected to be most in demand for the foreseeable future. Electric typewriters, especially those with correcting features, small desk and hand calculators, word-processing equipment, information retrieval systems, and basic accounting machines will sell well. Sales of copying machines also will continue to expand, and use of microfilming equipment is expected to increase by 1980.

As trained personnel become available, computer sales will increase steadily. Minicomputers are expected to become popular. ICL (U.K.) and Siemens (West Germany) have made sales proposals to their present customers, and Siemens is already selling minicomputers for traffic light control.

The availability of new computer products and new applications for existing equipment are expected to stimulate computer-related sales. Many firms in banking and tourist-related fields will install dedicated systems and purchase terminals to improve administration of their widespread operations. As the level of administrative expertise rises, use of existing equipment will grow, causing a parallel increase in the sale of computer storage equipment and other hardware. In addition, the lower cost of small computers will make it possible for businesses of moderate size to consider purchases as a means of increasing managerial efficiency, and the market for software will increase.

Other business equipment which Indonesian businesses will purchase includes addressing machines for speed and accuracy, telex machines to bypass communication difficulties, and automatic aids such as telephone dialing systems. As long as low-cost labor is readily available, collating/binding office equipment will not be an important item for offices and copying services; in many of the public copying

shops the entire family of the owner participates in any major collating job.

The Government's plans to modernize facilities for processing statistics and the research programs already being implemented will increase the need for analytical office equipment, data organizing, and storage facilities. New regulations concerning financial recordkeeping—including a requirement that all loan applications, both government and private must now be accompanied by detailed financial statements—will spur demand for basic bookkeeping and accounting machines.

Office equipment sales are expected to grow particularly rapidly among medium-size business firms. Proposed expansion plans will increase the volume of office work beyond the capacity of current office machines and employees. The large multinational corporations, already well equipped, are expected to purchase additional office equipment for special purposes and new branches.

Training programs and training schools are potentially big markets for office equipment. Both private and government training schools will need equipment. Suppliers should also consider setting up their own training facilities in order to guarantee the availability of trained operators for the firm's equipment. To be effective, however, suppliers' training facilities would need to teach basic mathematics, English, and such skills as alphabetical and numerical filing.

Management consulting services will be required to plan curricula for training schools and business training programs, as well as to assist in establishing new government and business offices.

IMPORT PROCUREMENT

Buyers Universe

The three major groups of business equipment buyers in Indonesia are the Government, private domestic firms, and the multinational and foreign corporations. Each major government office selects its own equipment. Actual expenditures are handled by the departmental purchasing office. Generally the user office presents a proposal for equipment needs to the purchasing office. If the proposal is approved, the user office director may then select the brands, models, and dealers. Many office directors have limited experience with business machinery and welcome technical advice from equipment sales personnel. Sales representatives should, therefore, first study government proposals to learn which government departments are likely to make major purchases; then approach office directors for details on needs; and finally, make sales proposals to both user

and procurement offices. The Government has established a committee to work on standardization of business equipment and to establish criteria to be considered in its purchase. Some consolidation of government purchasing therefore could evolve over the next few years, but office directors continue to defend their purchasing powers, and drastic changes are not expected to occur soon.

Some private domestic firms are well equipped with business equipment while most are highly labor-intensive operations. Managers of the former type are well informed on the use of business machines, while in the latter type, both knowledge of equipment and appreciation of its capabilities are very limited. In both cases the manager handles his purchasing directly. Sales representatives should assist private firm managers in assessing equipment needs, and be prepared to offer technical advice and financial assistance.

Newly established business firms are good candidates for purchases of office equipment. Lists of new business applications can be obtained from BKPM (The Capital Investment Coordinating Board) in Jakarta. Sales representatives should determine the owners of such new business firms and approach them at the earliest possible date to assist in the planning of office systems.

Multinational and foreign firms in Indonesia often make major purchases through their home offices although some purchases are made locally. In the case of one large U.S. corporation established in Indonesia, for example, the home office makes recommendations as to equipment capabilities and best value but the actual purchases are made in Indonesia. Although home office recommendations are usually followed, sometimes a specified model is not available, spare parts or service are lacking, and the purchase decision is made in Indonesia.

There are at least 35 Indonesian business consultant firms or equipment dealers who offer business consulting services. Foreign employees of Indonesian and multinational companies often play a significant consulting role in business equipment purchasing, even for business and government offices other than their own employer.

Foreign Suppliers Universe

Most manufacturers of business equipment are multinational firms and have assembly plants located throughout the world. Thus, brand names do not necessarily reflect the country of manufacture.

Virtually all types and brands of business equipment are available in Indonesia but locating a particular supplier at the time equipment is needed may be difficult. There are three major avenues for business equipment sales in Indonesia: Direct sales from

manufacturer to user, sales through Indonesian representatives, and sales through representatives based in Singapore and Hong Kong.

Some major office equipment suppliers who do not have their own sales office in Indonesia appoint exclusive sales representatives. Many of the smaller manufacturers sell their products through representatives which handle several brands and types of equipment. The leading office equipment sales representative in Indonesia is a private, family-owned and operated firm. It reportedly makes over half of the sales to buyers other than the multinational firms. The firm represents Adler, Triumph, and Olympia (West Germany), Hermes (Switzerland), Facit (Sweden), Olivetti and Totalia (Italy), Remington, Royal, Victor, and IBM (United States), and Sharp (Japan).

Nearly all equipment sales not made by Indonesian subsidiary offices or sales representatives are made by manufacturers' branch offices and representatives in Singapore or Hong Kong who make regular visits to Indonesia. For several years these suppliers stocked equipment in Singapore, but storage charges rose significantly in 1975 and 1976, and many are moving stock to Hong Kong. The slightly longer delivery time from Hong Kong is not considered significant. Trade sources indicate that some equipment enters Indonesia outside legal customs channels and is sold at lower prices than legally imported equipment.

American brands of business equipment predominate in the Indonesian market. IBM supplies 70% of the demand for computers and electric typewriters and NCR accounts for 80% of the sales of cash registers and billing equipment.

IBM is known for the quality of its equipment and for its guarantee of lifetime service. The age of some machines in Indonesia has occasionally made fulfilling that guarantee a real challenge, but a retired service representative in Singapore is sometimes called to provide service that cannot otherwise be obtained.

NCR supplies some equipment that is not available from any other manufacturer. Its machines are known for ease of operation and dependability even in the hands of relatively inexperienced personnel.

Both IBM and NCR benefit from their reputation for providing excellent training programs to Indonesian personnel in all areas of sales, service, and operation.

Other firms are leaders in supplying particular types of equipment. Sharp, with low prices and good service, sells the majority of adding machines and hand calculators. Olivetti advertises low priced manual typewriters that have the features of electric machines. Olympia is reputed to offer manual typewriters with the lightest touch, an important factor

during long periods of use. West German suppliers offer very competitive financial arrangements, and West German foundations have funded several special projects such as business training schools. Canon and U-Bix (Japan) are leading suppliers of inexpensive copying machines, but large firms and multinational corporations usually buy Xerox or IBM copiers. Wang (United States) is promoting its new word-processing units as having a higher performance level and more storage capacity than similarly priced machines.

Marketing Factors

The major factors influencing sales of business equipment in Indonesia are the reliability of the equipment, its technical capabilities, and service, including operator training, technical service, and availability of spare parts. There is a growing awareness in Indonesia that price is often directly related to quality, and that least expensive equipment is sometimes the most costly to maintain. Firms also are discovering that reliability is even more important than availability of service and spare parts. The desire for the most up-to-date office equipment has been tempered by experiences in which costly machines were not used to capacity or failed to make major improvements in the firm's operations.

The importance of providing service cannot be overestimated from the point of view of the customer who has little expertise or from that of the supplier who is attempting to secure a place in the market. Service should include technical advice prior to sale, training of personnel following sale, and retraining if needed. Problems with equipment often arise during the first months of operation, and several suppliers have found retraining necessary in Indonesia.

Maintaining an adequate supply of spare parts is very important in Indonesia. One major supplier lost both a current customer and an opportunity for significant future sales when it kept a government office waiting nearly a year for an office machine part. Suppliers should also allow considerable time for port clearance delays when replenishing stock, and supplies should be available in Singapore or Hong Kong, from where they can be airshipped to Indonesia.

Delivery time often determines an Indonesian purchase decision. Business firms are often forced to make purchases because of immediate need. Items which are not in stock or which require long delay in delivery may be dropped from consideration.

Credit arrangements are less important factors in the purchase of most business equipment than is the case for other capital equipment. Many types are relatively inexpensive and more expensive machines can be leased. The availability of liberal financing

terms would, however, increase the possibility of multiple-item sales to large firms.

Suppliers and sales representatives promote their business equipment in a variety of ways in Indonesia. They advertise extensively in newspapers and trade journals, and distribute catalogs and brochures to prospective purchasers. One East German company and a Portuguese firm, new to the Indonesian market, introduced business equipment with exhibits at the 1976 Jakarta Fair.

Electrical power in Indonesia is supplied at 127/220 V or 110/190 V 50 Hz, although some of the large foreign installations established in the country provide their own power at 115/220 V or 220/240 V 60 Hz. PLN (the State Electric Power Company) is converting service to 220/380 V 50 Hz, but this conversion is not expected to be completed until after 1980.

Business equipment suppliers should consider the Indonesian environmental conditions in which equipment operates. Air-conditioning is not widespread. Allowance must be made for moisture, dust, and heat. Even when air-conditioning is installed at the user facilities, special care must be taken in packing and shipping to Indonesia. One purchaser, for example, received a shipment in which all small parts such as springs and screws were so badly corroded that the machine was inoperable.

COMPETITIVE POSITION OF U.S. SUPPLIERS

American manufacturers occupy a strong position in the Indonesian market for business equipment. U.S. equipment is well known and highly respected. Most Indonesian firms feel that U.S.-made products are the best available. Not only is U.S.-origin business equipment known to provide the most advanced in technology, but it is also quite competitive in price with other brands, including some with far less to offer in terms of capabilities.

U.S. firms generally provide good service in Indonesia. IBM's worldwide service guarantee, for example, is supported in Indonesia by 20 salesmen and 80 servicemen in the typewriter division and 50 salesmen and 50 servicemen in the computer section.

As the Indonesian market for business equipment

increases, however, foreign competition will become stronger. Because competitors are launching intensive advertising campaigns and offering training and financial incentives, U.S. manufacturers will have to increase their sales promotion if they are to maintain their market position.

Some U.S. suppliers are criticized for giving quick solutions to complicated problems. Sales advice should include careful planning with the prospective buyer and full explanations of both equipment capabilities and potential problems.

U.S. suppliers should establish dependable permanent representation in Indonesia, including trained service personnel and the maintenance of ample equipment and spare parts stocks.

Marketing in Indonesia should extend beyond Jakarta, either in the form of branch representation or regular trips by Jakarta-based personnel. The business communities of Surabaya, Semarang, Bandung, and Medan are strong potential business equipment users, as are many firms in smaller cities.

Training programs both in equipment use and in management methods can create interest in purchase of U.S. equipment and expertise. Such training programs also permit sales representatives to assure buyers of service availability. Because many Indonesian office clerks have not had formal training, a manufacturer who offers to train the end user's employees will have a distinct advantage in sales promotion.

Suppliers should also look for opportunities to participate in special training projects, such as government training programs or those of international organizations.

There are opportunities for sales of new types of business equipment in Indonesia. In 1976, for example, there were no addressing services available in the country.

Equipment demonstration is a key method for building new sales. Many Indonesian businessmen are not familiar with advanced equipment capabilities or operating procedures, and many are not convinced that their personnel can be trained to operate modern machines. Exhibits at the annual Jakarta Fair in June-July provide sales promotion to a wide variety of business equipment users. Such demonstrations and exhibits should concentrate on middle-range, easily operated equipment.

Medical and Health Services

During Indonesia's current 5-year development plan (Repelita II 1973/74-1978/79), government spending for medical and health services is budgeted to increase 39% over the preceding 5-year period. Investments in private medical services during that period are expected to show comparable gains. Major public spending is planned for equipping public health clinics, raising the technical competence of hospital laboratories, and training additional personnel. Expenditures in private health facilities are expected to be mainly for general hospital and laboratory equipment. Medical disposables are a field of growing interest in Indonesia, and private medical sectors have plans to expand and improve existing laboratory facilities.

Indonesia's plans to triple available medical personnel over a 5-year period will necessitate the expansion of training facilities, and will make equipment sales proposals which include in-depth training programs very marketable. Sales proposals for entire laboratory and clinical systems which include installation and training services will be of interest to Indonesian buyers in coming years.

Although there has been some increase in recent years, Indonesia's ratio of physicians to population is still very low (1 to 22,000). There is also a serious shortage of well-trained nurses and paramedical personnel. Since most of Indonesia's population lives a great distance from existing medical and health facilities, the country's medical problems will not be solved by simply increasing the number of medical personnel.

The Government is placing prime emphasis on overcoming these problems, and as a result, the Indonesian market for medical and health care equipment is expected to grow from \$9.7 million in 1975 to nearly \$27 million in 1980.

American medical equipment enjoys a good reputation for quality, durability, and reliability in Indonesia, and suppliers of U.S.-manufactured equipment will be able to obtain increasing sales if they are willing to become directly involved in marketing service, training, and promotion activities.

STRUCTURE OF MEDICAL AND HEALTH SERVICES

During the colonial period, the Dutch built and operated a number of hospitals that were usually located in major urban areas and used primarily for European patients. After independence they were taken over by the new Government and became the nucleus for an expanded and comprehensive health care system for the population at large.

As of mid-1976 there were 1,164 hospitals in Indonesia, 86% of which are owned and operated by the Ministry of Health; the hospitals provide 82,327 beds (see table 1). These figures compare with 712 hospitals and about 71,500 beds in 1964. Most of the hospitals provide general services; about one-fourth were for maternity cases. Other specialized facilities exist for the treatment of leprosy, respiratory diseases, mental diseases, venereal diseases, and ophthalmic diseases. These facilities are staffed by 7,000 licensed physicians and medical specialists. Indonesian law requires all private physicians to work half-time for the Government, and the vast majority of these government-employed physicians have private practices or teaching positions. The major exceptions are doctors working in medical facilities of private companies. International aid programs and various charitable organizations, such as churches and religious institutions, also provide medical and health assistance in Indonesia.

Government Health Facilities

Department of Health.—The shifting emphasis into preventative health care and the growing awareness of the importance of health education has been reflected in the reorganization of the Ministry of Health during Indonesia's current 5-year development plan. The Minister of Health is now assisted by a Secretary-General and an Inspector General; each has separate responsibilities for administrative functions in planning, organizing, staffing, training, coordinating, reporting, budgeting, and evaluating. Executive functions are now delegated to four directors-general with responsibilities as follows: Directorate-General of Family Health, Directorate-General of Medical Care, Directorate-General of Communi-

Table 1.—Indonesia: Number and Distribution by Province of Hospitals, Doctors, and Dentists—1974/75

Province	Hospitals	Beds	Population Per Bed	Doctors	Population Per Doctor	Dentists	Population Per Dentist
Java and Madura							
Jakarta	119	6,291	727	1,358	3,370	196	23,347
West Java	138	10,488	2,063	502	43,093	23	940,565
Central Java	92	10,998	1,989	420	52,088	46	475,587
Jogjakarta	36	2,946	845	215	11,581	3	830,000
East Java and Madura	120	12,397	2,059	464	55,015	85	300,318
Subtotal	505	43,120	1,765	2,959	25,719	353	215,586
Sumatra							
Aceh	31	1,909	1,804	25	137,760	1	3,440,000
Sumatra	117	11,362	244	241	11,523	12	231,417
West Sumatra	26	1,370	379	131	3,962	10	51,900
Riau	24	554	1,815	39	25,795	2	503,000
Jambi	8	503	3,264	29	56,621	1	1,642,000
South Sumatra	32	3,043	916	141	19,808	20	139,650
Bengkulu	5	240	27,596	24	275,958	—	—
Lampung	22	758	2,650	44	45,659	6	334,833
Subtotal	265	19,739	1,054	674	30,880	52	400,250
Kalimantan							
West Kalimantan	26	1,347	1,499	33	61,212	4	502,250
Central Kalimantan	11	319	2,194	10	70,000	1	700,000
South Kalimantan	17	820	2,072	30	56,633	4	424,750
East Kalimantan	16	1,173	626	25	29,360	3	244,667
Subtotal	70	3,659	1,408	98	52,571	12	429,333
Sulawesi							
North Sulawesi	44	3,978	432	84	20,452	8	214,750
Central Sulawesi	11	576	1,586	18	50,778	2	457,000
South Sulawesi	129	2,894	1,793	99	52,414	5	1,037,800
Southeast Sulawesi	15	460	1,552	10	71,400	1	714,000
Subtotal	99	7,908	1,079	211	40,450	16	533,438
Other Islands							
Bali	24	1,920	1,104	42	50,476	5	424,000
West Nusa Tenggara	11	902	2,441	17	129,529	3	734,000
East Nusa Tenggara	27	1,450	2,583	18	127,500	4	573,750
Maluku	28	1,432	760	30	36,300	9	121,000
Irian Jaya	35	2,197	—	—	—	—	—
Subtotal	125	7,901	5,459	107	403,084	21	2,053,810
Total	1,164	82,327	1,451	4,049	29,750	454	297,500

Sources: Central Bureau of Statistics and industry sources.

cable Disease Control, and Directorate-General of Drug and Food Control. Under each of these departments are several Directorates, each with specific assigned responsibilities.

In addition, the Department of Health includes the Institute of Health Research and Development, which is directly responsible to the Minister and serves as the coordination body for the specialized research institutes under the Department. The address for the Department of Health is: Department of Health, (Jl. Prapatan 10, Jakarta, Indonesia).

Provincial Departments of Health.—In each of Indonesia's 27 provinces,¹ the Department of Health is part of the Provincial Government. While national health planning and the administration of various medical services, ranging from disease control to family planning, is the responsibility of the central health authorities, execution of department policies and programs is primarily the responsibility of the provincial health departments. The provinces fund a

majority of their own services and have considerable autonomy. The internal organization at this level repeats the pattern of the national Department of Health. The Director of a Provincial Health Department is responsible to the Governor of the Province for administrative and operational matters and to the national Minister of Health for medical and technical matters.

Regency Health Office.—Below the provincial level, the organization of the Regency Health Offices also follows the central pattern, although much simplified. The Regency Health Officer is administratively responsible to the Bupati (Regent—Head of the Regency Government), and in technical matters, to the Director of the Provincial Health Department. Sub-District Health Officers are responsible to the Regency Health Officers for administration of health centers and rural health services.

In order to provide wider availability of medical services and to upgrade the quality of specialized care, the Indonesian Government is reorganizing its medical service system. The foundational units in the

¹ The former Portuguese territories in Timor, Lesser Sundas, became Indonesia's 27th province, East Timor, in mid-1976.

reorganization are the 3,400 subdistrict health centers (Kecamatan) which provide general care for injury and illness and focus on public health education and preventive medicine. More serious cases are sent to the 265 regency hospitals (Kabupaten), or, if necessary, to the provincial hospital where specialized equipment and staff are available. This reorganization is designed to permit the most effective use of funds and personnel in a situation where both are in short supply.

Typical of government medical facilities is the Rumah Sakit Propinsi Sumatera Utara (North Sumatra Provincial Hospital) in Medan. The hospital was founded in 1929 by the Dutch, and with the addition of an out-patient wing in 1969 and a general ward in 1970, it still uses the original facilities. There are 150 physicians on the staff, 80% of whom teach at the government medical school. Departmental specialties include internal medicine, surgery, obstetrics, gynecology, pediatrics, orthopedics, cardiology, and family planning, each of which has several doctors as part of its permanent staff. Most department heads have been trained abroad, but the younger doctors are graduates of Indonesian schools.

In 1976 the hospital was operating at only 50% of its 755-bed capacity. Staff members give three reasons for this low occupancy level: (1) a popular mistrust of medical services in Indonesia, which arises from general lack of health education and perhaps, previous experiences with poor quality medical care, (2) present policy requires a cash deposit of about \$2 per day in advance of admission, which although small by Western standards, is beyond the means of many Indonesians; and (3) the Government's medical system reorganization structure now provides care in the outlying clinics for less seriously ill patients who formerly were treated at the hospital.

Much of this provincial hospital's older equipment, including four medically equipped jeeps, came from the United States through donations and grants. Such donations, however, have been drastically reduced. The hospital's recent equipment purchases have been primarily for replacement of obsolete or wornout items, but include some purchases for upgrading in the surgical and obstetrical departments. Laboratory expansion is planned for the near future.

Military Hospitals.—Military hospitals are administered under the supervision of the Ministry of Health and account for over 5,000 beds. These facilities provide medical care for both military personnel and their families, and vary in size from the 600-bed Rumah Sakit Gatot Subroto in Jakarta to small field-type hospitals. The average size is 50 beds, and the average hospital has limited general care and little laboratory equipment. The Army, Navy, and Air Force have separate facilities under their jurisdiction. Principal army hospitals (over 200 beds) are located

at Jakarta, Medan, and Pematang Siantar (North Sumatra), Palembang (South Sumatra), Cimahi (West Java), Magelang (Central Java), Malang (East Java), and Ujung Pandang (South Sulawesi). Important hospitals of the other services include: Air Force (Bandung, West Java), Navy (Jakarta and Surabaya, East Java), and Police (Jakarta).

Private Medical Institutions

Major categories of private medical institutions are: (1) private hospitals, (2) company facilities, and (3) private practices and clinics.

Private Hospitals.—Many of Indonesia's private hospitals were founded by nonprofit, charitable organizations, such as churches and religious institutions and some still maintain direct ties and support from these groups. Others operate strictly as medical service businesses. Most private hospitals are in the 200- to 400-bed range and are usually better equipped than their public counterparts.

Santa Elizabeth Rumah Sakit, a representative private hospital in Medan, North Sumatra, has 350 beds and includes an out-patient clinic and departments of internal medicine; eye, ear, nose, and throat; pediatrics; surgery; obstetrics; and gynecology. The hospital plans to open new departments of dermatology and ophthalmology in the near future. The staff includes 25 doctors (all of whom have received training abroad and have private practices in addition to their staff positions), 64 nurses, 16 midwives, seven practical nurses, 5 laboratory analysts, three X-ray technicians, and 2 assistant pharmacists.

Santa Elizabeth hospital is considered to be among those having the highest standards in North Sumatra and is constantly improving available services. Though well-equipped by Asian standards, it would be considered inadequate in the West, the most obvious deficiencies being in laboratory equipment and blood processing and storage facilities. The hospital operates at 65% capacity. Charges are based on quality of accommodations and ability to pay and vary greatly. A patient in an 8- to 12-bed ward pays \$1 per day, including charges for food.

The majority of Santa Elizabeth's equipment is of German manufacture, but facilities also include items donated from supporting organizations in Holland and the United States.

In Jakarta, Cikini Hospital and St. Carolus Hospital are often mentioned as examples of high quality private medical institutions in Indonesia. There is also a large group of private hospitals and clinics with 50 to 75 beds each, which are mainly outside of the major Indonesian urban areas. They run by a physician or group of physicians as an in-patient clinic or small hospital. However, the increasing availability and rising quality of government

care, coupled with high costs for private facilities, is causing the occupancy rate to drop in many of these facilities.

Company Medical Facilities.—Private company medical facilities range in size from a single room with a nurse on call to some of the most modern hospitals in Indonesia. Most factories that employ 50 persons or more provide some type of medical facility. The minimum is a first-aid station for treatment of minor on-the-job injuries and illnesses, while some larger firms have moved into preventive medicine and offer health education, inoculations, and a regular schedule of checkups and X-rays.

Excellent medical care is provided at the large, foreign investment, industrial complexes, such as the Caltex operation in Sumatra and Bechtel's Arun LNG complex at Aceh, North Sumatra.

The Bechtel hospital is a semi-prefabricated construction staffed by 3 doctors, a dental assistant, and 10 registered nurses. The 28-bed facility operates at 50% capacity with an average of four new admissions per day and 500 out-patient visits per week. Equipped to the level of a modern, moderate-size hospital by Western standards, it handles injuries, illnesses, minor surgery, dental work, and major emergency care. The seriously ill or injured are taken to the district hospital. The Bechtel Arun facility also offers a regular plan of checkups and preventive medicine and a program designed to upgrade the general health of their Indonesian workers. Recent equipment acquisitions include a complete set of dental equipment.

Caltex medical facilities in Sumatra include a 75-bed hospital at the headquarters, two 18-bed field hospitals at Duri and Dumari, a clinic at its petroleum terminal, and a second clinic at Minas oil field. Staff consists of 16 doctors, 7 pharmacists and assistant pharmacists, 55 nurses, and 14 midwives.

Total Caltex investment in hospital equipment and facilities, including buildings, is \$478,000. In 1975, \$75,000 was spent on equipment and an additional \$45,000 is expected to be invested in 1976. Considerable equipment in the Caltex facilities is from the United States (see table 2), because most purchasing was done in the United States during the initial years of operation. The major exception is in the Pediatric Department, which was headed by an English physician for many years; much of its equipment was purchased in the United Kingdom. American influence is expected to continue in future years as Caltex recently commissioned a study by Westerman Miller Associates, resulting in a recommendation for a 3-year renovation and expansion plan which includes a new operating room, kitchen, ward, central sterile supply, out-patient areas, and a doubling of the Duri

field hospital capacity. Projected cost is \$7 million, including \$2 million for equipment and furniture.

Rumah Sakit Pertamina Kabayoran, Jakarta, is another privately operated hospital primarily for employees, foreign contractors, and dependents of Pertamina, the Indonesian State petroleum corporation. The medical staff includes a team of American specialists. Departments include: internal medicine; cardiology; pediatrics; general surgery; urology; orthopedics; obstetrics; gynecology; neurosurgery; neurology; ear, nose, and throat; dermatology; venereology; ophthalmology; physiotherapy; radiodiagnostics; radiotherapy; dentistry; oral medicine; and nuclear medicine.

Plantation Medical Facilities.—Indonesian law requires that plantations establish hospitals for employee medical care. The majority of these hospitals are little more than first aid clinics with in-patient facilities and are supplied with old and limited equipment. However, a few of them are staffed by older, Dutch-trained physicians who, though not up-to-date on modern techniques, often provide excellent medical care.

Private Practice and Clinics.—Since the majority of physicians working for the Government also have private practices, there are a great many small office-clinics throughout the urban areas. Primarily sole-physician practices, they are often located in the doctor's house and include minimal examination and treatment equipment.

Teaching Institutions

There are more than 500 government medical education institutions in Indonesia (see table 3), includ-

Table 2.—Indonesia: Caltex Hospital Equipment List

U.S.A.
Spectrophotometer (Coleman)
Electrophoresis machine (Deckman)
Microscopes (American Optical and Bausch and Lomb)
Centrifuges (Adams Clay)
Universal Centrifuge (IEC)
Tracheotomy set (Jack)
Polarimeter (Kein)
Sterilizers (Castle)
Germany
Blood Bank
Photometer (Leitz)
Cystoscope (Richard Wolf)
500 milliamperes X-ray unit (Siemens)
100 milliamperes X-ray units (2) (Siemens)
Ultrathelm (Siemens)
Operating table (Siemens)
Metabolostat (Siemens)
Japan
Microscopes (Japan)
100 milliamperes X-ray unit (Picker Hitachi)
United Kingdom
Heart ultrasonic fetal units (Sonicaid)
Syntocinon (Cardif Pye)
Infant incubators (Vickers)
Operating table (Allen Hanbury)

Table 3.—Indonesia: Government Medical Education Institutions by Province and Type of Institution—1974/75

Province	Medicine	Dentistry	Dental Hygienist	Midwifery ¹	Specialized Nursing ²	Nursing ³	Pharmacy
Aceh	—	—	1	1	—	11	—
North Sumatra	1	1	1	17	1	35	1
West Sumatra	1	—	—	3	—	9	1
Riau	—	—	—	—	—	2	—
Jambi	—	—	—	1	1	3	—
South Sumatra	1	—	—	4	1	11	—
Bengkulu	—	—	—	2	—	1	—
Lampung	—	—	—	2	—	3	—
Jakarta	1	1	4	6	5	15	1
West Java	1	1	1	14	3	25	1
Central Java	1	—	—	13	—	19	—
Jogjakarta	1	1	—	5	—	8	1
East Java & Madura	1	1	1	12	1	19	1
Bali	1	—	—	1	—	4	—
West Nusa Tenggara	—	—	—	2	—	2	—
East Nusa Tenggara	—	—	—	5	—	7	—
West Kalimantan	—	—	—	1	—	3	—
Central Kalimantan	—	—	—	—	—	5	—
South Kalimantan	—	—	—	1	—	9	—
East Kalimantan	—	—	—	1	—	4	—
North Sulawesi	1	—	—	2	—	12	—
Central Sulawesi	—	—	—	—	—	2	—
South Sulawesi	1	—	1	6	1	12	1
Southeast Sulawesi	—	—	—	2	—	2	—
Maluku	—	—	—	2	—	6	—
Irian Jaya	—	—	—	5	—	25	—
Total	11	5	8	108	12	257	7

¹ Includes midwife assistants and instructors.

² Includes nurses, nurses and dental hygienists, and nurses' aides.

³ Nurses, assistant nurses, and nurses' dental hygienist aides.

Source: Ministry of Health.

ing 11 medical schools, 5 dental schools, 80 schools or academies of nursing, and a variety of other institutions, such as schools for laboratory technology and midwifery. The University of Indonesia Medical Facility in Jakarta, founded in 1851 by the Dutch, is the oldest European medical school in East Asia. Other leading medical schools are located at Gajah Mada University (Jogjakarta), Airlangga University (Surabaya), University of North Sumatra (Medan), Andalas University (Padang), Hasanuddin University (Ujung Pandang), and Pajajaran University (Bundung). There are also dental schools at the University of Indonesia, University of North Sumatra, and at Pajajaran, Gajahmada, and Airlangga Universities. In addition to government-sponsored institutions, several private hospitals offer medical or nursing training, as well as a selection of specialized courses. On-the-job training is sometimes used to fill basic and less technical positions, such as nurses' aides, orderlies, and laboratory assistants. There is wide divergence in the quality of these institutions, and the majority of both public and private schools are understaffed and underequipped. The majority of the faculty members in Indonesia's medical schools have received extensive training overseas, but those in nursing schools are primarily locally educated. There are government plans to increase support for these teaching institutions, but the need is not considered as crucial as other medical areas and planned expenditures may be postponed.

Specialized Institutes

Under the coordination of the Institute of Health Research and Development of the Department of Health, there are a number of specialized agencies and institutions, both private and governmental, concerned with national health and medical problems. Some conduct clinical studies and perform operational research in the causes, treatment, and control of specific diseases as well as develop methods and trained specialists for disease control. Others, in addition to their research activities, produce vaccines and remedies for use by the medical profession and operate various control and eradication programs in support of the national health program.

The oldest of these specialized organizations is the Eykman Institute, founded by the Dutch in 1888 to study beriberi. It has expanded into other fields and has become a complex of three separate but related institutes. The parent organization continues to concentrate on seriological, bacteriological, and chemical research on ailments caused by nutritional deficiencies. It also supervises the Blood Transfusion Service of the Indonesian Red Cross Society.

One of the institute's subordinate agencies, the Nutrition Institute, performs valuable research on food and dietary requirements and is a leader in the development of food supplies and public health education for pregnant women and mothers. The other

Eykman subordinate, the Malaria Institute, conducts clinical studies of malaria and other insect-borne diseases and plays a key role in the national malaria control and eradication program.

Two other important health institutes are the Central Veterinary Institute at Surabaya and the Veterinary Institute at Bogor. Both carry out extensive research on animal and animal-borne diseases. The Central Veterinary Institute is particularly noted for its work on production of vaccines to control hoof-and-mouth disease as well as anthrax, Newcastle disease, and undulant fever.

The State Biopharmaceutical Institute at Bandung is perhaps the most important of the research-production-educational health centers in Indonesia. Originally founded as the Pasteur Institute in 1890, it has gained worldwide recognition for its work in research and the development and production of vaccines, antitoxins, and antibiotics for a host of endemic diseases. It also is a major training center for nurses, health inspectors, and laboratory technicians.

Auxiliary Medical Organizations

Palang Merah Indonesia.—Palang Merah Indonesia (The Indonesian Red Cross) is active in the medical field throughout the country. It has a broad program of pre- and post-natal education and care and is involved in health education for the young. Membership of the Indonesian Red Cross includes the more well-known families in each community, and a variety of fund-raising projects provides a steady income for the support of its programs.

Indonesian Planned Parenthood Association.—The Indonesian Planned Parenthood Association was formed as the initial force for family planning in Indonesia. Prior to government involvement, this organization pioneered in the establishment of clinics and in rural family planning education. Its work is now concentrated in several projects located in selected villages and in a number of highly imaginative publicity campaigns.

TRENDS, PROGRAMS, AND PROJECTS

Limited financial resources prevented actualization of many medical and health service programs that were planned for implementation during Indonesia's first 5-year development plan (Repelita I), and a number of other factors combined to keep even the reduced programs from reaching the vast majority of the people. However, considerable progress is being made during the current plan. With public health considered a priority issue, expenditures in the health sector were projected to increase from \$38 million in 1974/75, to an average of \$82 million annually dur-

ing the remaining 4 years of the second plan (see table 4). However, inflation rates since 1974 have put pressures on Indonesia's budget allocations, and continued progress in some of these medical programs appears to depend on the support of international agencies, such as the World Bank, the United Nations, the World Health Organization (WHO), and other foreign government assistance agencies.

Repelita I included a general statement of the objective "to raise the level of people's health." Priority programs were health education and the development of medical infrastructure, with family planning listed as priority number six. The plan included the establishment of health centers in every subdistrict that did not yet have one, and the upgrading of those centers already in existence. Two major factors combined to reduce this program. First, the world recession cut the already tight health budget, and many of the planned centers were never built or improved. Second, lack of trained personnel prevented the full utilization of existing facilities and programs. In Java and Bali, only 50–60% of the centers are serviced by medical doctors, and the situation is even more severe in more remote regions.

The pressure of the rapidly increasing population also forced a redirection of emphasis during the first development plan, and in 1970, resulted in the founding of the National Family-Planning Coordination Board (BKKBN). Despite its small staff—a director, 3 deputies, and 200 workers—it is one of the few Repelita I programs to exceed its original goals. One factor contributing to the success of this program was

Table 4.—Indonesia: Planned Expenditures for Medical and Health Services for 1974/75 and Repelita II
(in millions of U.S. dollars)

	1974/75 Development Budget	Total Repelita II Budget
Health, Family Planning, and Social Welfare Sector		
Health Extension Service Program	1.3	21.4
Health Services Program	19.2	137.6
Eradication of Communicable and		
Common Diseases Program	16.9	121.4
Nutrition Improvement Program .....	.6	16.1
Control of Foods and Drugs, etc. Program.	.5	10.6
Health Subsector	38.4	307.2
Promotion of Social Welfare and Change		
Program	1.5	20.5
Social Aid and Assistance Program	1.4	15.7
Social Welfare Subsector	2.9	36.1
Other Health and Social Welfare		
Activities ¹	4.4	30.0
Total expenditures	45.7	373.3

¹ Activities whose financing is counted in other sectors including General Education and Development of the Younger Generation, Education in Health, Family Planning, and Social Welfare; Development of Science and Technology, Research and Statistics, Research on Health, Family Planning, and Social Welfare.

Source: Repelita II.

the use of trained lay personnel as field workers. Although considered one of the most successful family planning programs in Asia, it is still a long way from making significant headway on a major problem.

Repelita II brought a change in the Government's priorities with family planning assuming first place. Direct attention is also being given to the more equitable distribution of health services through an intensification of the public health system. Attention is being focused on five major fronts.

Family Planning.—Intense efforts to stem the growth of the country's population, which is projected to double in 27 years, will continue. Major problems include accessibility to services and the development of new simplified contraceptive methods. Those methods presently used by the majority of Indonesian women, such as birth control pills and the IUD, require medical supervision, which is not generally available. Although condoms are publicized, marketed, and in wide use, male-oriented programs cut across present Indonesian cultural values. Thought is being given to the promotion of vasectomies through extensive publicity, educational efforts, and some form of direct-reward incentives. Political considerations will probably postpone this program until 1978. Abortion is considered illegal in Indonesia and is not considered a viable option.

Health Centers.—The goal of establishing a health center in each subdistrict has been reaffirmed under the current national development plan. Staffing will continue to be a problem and incentives such as housing are being offered to persons willing to serve in the outlying regions. Medical graduates, all of whom are required to serve 3 years with the Government, and scholarship students, who must serve 1 year for each year of financial assistance they receive, are being assigned to rural areas.

Public Health Instruction.—In a nation where the life expectancy is 48 years and the average person gets only 38% of the recommended daily requirement of protein, health education and nutrition are major factors in preventive medicine. Plans call for schools, clinics, and trained field workers to focus on health instruction, offer sanitation and hygiene advice, provide nutritional guidance, and enlist public participation in a variety of projects. Difficulties lie in the relatively small numbers reached by the schools and clinics, and by public apathy toward the projects.

Water Supply.—Attention is being directed toward ensuring an adequate and safe water supply. In the urban areas, such as Jakarta, Bandung, and Surabaya, studies are underway preparatory to extensive long-range major improvements, while rural programs are directed toward cleaning up existing water sources, digging new wells, and educating about sanitation.

Though water supply technically is the responsibility of the Ministry of Public Works, officials in the Public Health Department have taken over the completion of all but the major projects. New projects, both domestic and those in cooperation with agencies such as the United Nations (UNICEF), are announced weekly. These projects vary in cost from a few hundred dollars to \$1 million. In 1975-76 a major program was launched to attack both water-carried diseases and those which result from lack of sufficient water.

Sanitation.—Heavy emphasis is being placed on public and private sanitation projects. These projects vary in size and complexity from the Family Latrine Project (500,000 latrines) to major projects for the overhaul of the sanitation systems of cities, such as Jakarta and Bandung. Some rural projects are getting underway, but most city projects have been in the planning stage for several years and are having difficulty moving to implementation. Emphasis in the 1975-76 budget is on subsidizing locally determined village projects, with each village and district eligible for government funds.

In the private medical sector, there has also been a shift in direction within the past few years. In the early 1970's, there were many purchases of high technology medical equipment items, which were often misused by underskilled personnel. There was a tendency to provide care on the basis of ability to pay, which sometimes resulted in overtreatment, as well as undertreatment. Private hospitals now seem more concerned with overall upgrading and modernization, with an emphasis on improvement of laboratory instrumentation.

International Assistance

A major health project, initiated in Indonesia during 1972, is supported by the International Development Association (IDA) in cooperation with the United Nations Fund for Population Activities (UNFPA). At a cost of \$29 million, this project is limited to the high priority areas, Jakarta, East Java, and Bali provinces, but was meant as a model for projects in other areas. Its main focus is family planning, but it covers the rebuilding and equipping of 277 health centers and a variety of training programs in medical and nonmedical support occupations, including the construction of several new facilities for classroom instruction.

There are two major international agencies, and several charitable and religious organizations currently providing assistance to the Indonesian medical services, each with a different focus and approach, and each apparently with a different degree of success.

World Health Organization (WHO) sees its primary role as providing technical assistance to enable the Indonesian Government to accomplish the health objectives of the current national development plan, whose goals are controlling communicable disease, upgrading family health, education, and training local personnel. WHO has consultants assigned to each major department within the Health Ministry, as well as many specialists in the field. Its annual budget of \$1.5 million is spent primarily on personnel, with some expenditures for equipment and drugs. Most WHO personnel are pleased with the progress being made, although some, acknowledging progress in the health field and improvements at the top levels, question the effectiveness at the local level.

United Nations Children's Fund (UNICEF) with a budget of over \$3.5 million per year is experiencing some difficulties. After an early and solid start as one of the main external sources of equipment, there has been a change in direction, resulting in some internal and external disagreements. Former beneficiaries, such as provincial rural health programs, no longer receive equipment. At a mid-1970's conference in Jakarta, the American delegation voiced serious disagreement with the proportion of the budget spent for personnel and travel, as compared to that which was formerly spent for equipment. The UNICEF 1975 Annual Report also reflects some difficulties in coming to agreement on common goals with the national planning board. At this time, it is not known if UNICEF will utilize their funds on major purchases of equipment. In spite of these difficulties, UNICEF continues to approve new projects, many of which concern improving water supplies.

Additional Funding

During the mid-1970's the majority (58%) of costs for medical and health services has been carried by the Indonesian Government, with most of the remainder contributed by United Nations Agencies, the China Medical Board, CARE-Medico, and several countries belonging to the Inter-Governmental Group for Indonesia (IGGI). During the 1969-75 period, principal project aid for medical facilities and laboratories from IGGI donors was as follows: United States \$25.2 million, Netherlands \$5.8 million, Belgium \$1.1 million, United Kingdom \$600,000, Germany \$3.5 million, and France \$150,000. The immediate necessity for large sums requires the Government to seek increased contributions from domestic as well as outside sources.

Employee health insurance schemes have been offered by many Indonesian private companies as a means of keeping qualified employees. It would not be surprising for the Government to require participation in such programs by all private firms.

The "Gotong-Royong" (mutual assistance) movement was started in 1974 by the private Yayasan Indonesia Sejahtera foundation with the backing of church funds from West Germany. A program whereby a local community assumes responsibility for its own health care, it has recently been adopted by the Government. As a part of the program, each community selects members to be trained as health workers responsible for nutrition, sanitation guidance, and first aid. Plans call for eventual training to the level of paramedics. Each community also collects monthly funds from its members and then purchases its own equipment and provides medical care for all members. The amount of the collection is locally determined, but is usually about .5% of monthly income. Several small pilot projects have been well received, and plans for expansion are underway.

The U.S. Agency for International Development (AID) has been a major source of assistance to health care development. Through 1974/75, AID provided a total of \$25 million for family planning programs. A 3-year project, initiated in 1975, provides assistance to the Department of Health in developing a variety of rurally oriented health service projects.

GROWTH PROSPECTS

The need is critical for extended health facilities throughout Indonesia. As of 1976, there was only one doctor per 22,000 population, with very uneven distribution of medical service across the nation. Although there is at least one health center in every subdistrict, many of them are severely underequipped and understaffed, and medical care is both inaccessible and financially out of reach of the vast majority of the people. In spite of intensive and successful programs in family planning, the population continues to rise and is expected to reach 150 million by 1980.

One measure of expected growth in medical service is the increase in trained medical personnel planned for Repelita II (see figure 1). All categories of medical personnel are planned, to increase from a minimum of 63% for one category to a high of 300% for others (see table 5). It is hoped that this expansion will provide the staffing necessary for the continued spread of the rural health program.

Another indicator of the Government's intention to support increased health services is the \$307-million public health budget proposed during the current national plan (see table 4). The annual budgeted amount was increased each year since the beginning of the second 5-year plan until government financial difficulties caused a cutback in the 1976-77 proposed budget. (It is hoped that additional funding from ex-

Figure 1.—Indonesia: Doctors and Paramedical Personnel

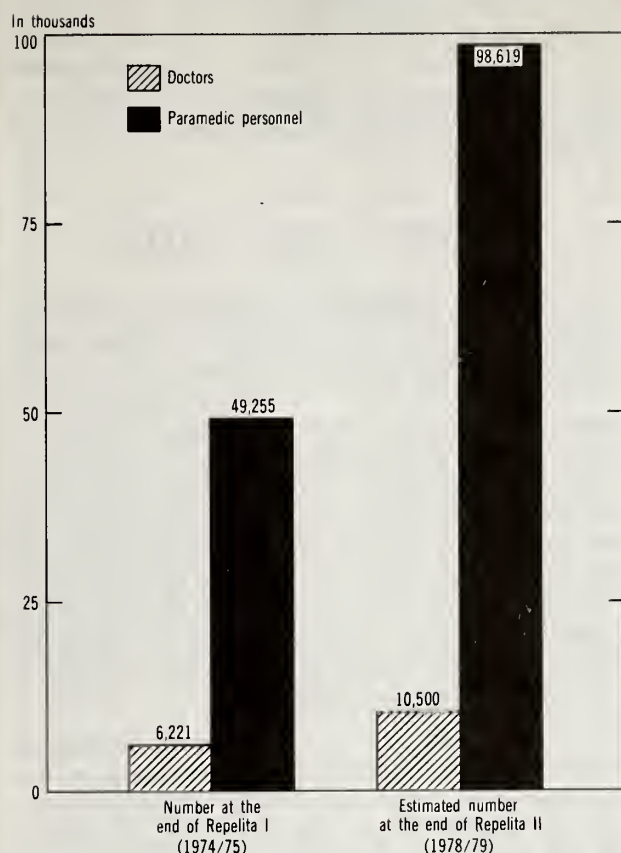


Table 5.—Indonesia: Health Personnel

Type of Personnel	End of Repelita I	Projection Repelita II	Percent Increase
Doctors	6,221	10,500	69
Nurses (Academic)	439	930	113
Health Inspectors	597	972	63
Nutrition Officers	131	231	76
Nursing and Midwife Instructors and Public Health Officers	601	1,276	112
Assistant Health Inspectors	1,081	3,519	226
Nursing Instructors, Midwife Instructors, Public Health Officers (1 year)	248	998	302
Midwives	8,323	15,823	90
Nurse's Aides and Dental Health Nurses	7,736	16,686	116
Nutrition Assistants	199	399	100
Laboratory Assistants	608	1,233	123
Pharmacy Assistants	4,573	13,698	199
Assistant Dental Nurses/Technicians	472	1,347	185
Health Assistants	24,248	41,498	71
Health Attendants and other Health Auxiliary Personnel	26,617	—	—

Source: Repelita II and estimates based on trade source interviews.

ternal sources will make these reductions unnecessary.) Comparison of the allocations with percentages of realization in the national development plan shows

that the percentage of previous success varied from a low of 40% realization to a high of 90%, with most categories, such as drug control programs, water supply, construction, training, and health education, reaching about 60% of proposed goals. The priority that the Government has put on increased health services during the current national plan has resulted in exceeding goals in several areas, such as health center construction which achieved the 1979 goal of 2,400 units in 1976. However, many of these health centers are practically empty buildings where a doctor or nurse comes occasionally to check on patients.

Private medical institutions have recently experienced a reduction in occupancy rate. Two major reasons are the recession, which reduced available income, and the steadily increasing quality and availability of government medical care. An improvement in either the general economy or in the expansion of health insurance plans may reverse this trend, as patients generally express a preference for selecting their own private doctor. However, it will take a large increase in middle-class incomes to significantly affect growth in the private medical sector.

MARKET SIZE

In 1975, medical equipment sales in Indonesia totaled \$9.7 million, of which \$.7 million was of electromedical equipment; \$2.1 million was of X-ray equipment; and \$6.8 million included other medical and dental equipment, such as furniture, laboratory items, surgical apparatus, and specialized items including dialysis machines and intensive-care monitoring equipment (see table 6). Moderate additional amounts of equipment come under various grants and tax-free categories, or are included in "Personnel and Equipment" budget categories without further breakdowns, and may not be included in official statistics. Growth is projected to continue, with estimated 1976 sales of \$12 million and projected 1980 sales of \$26.9 million—nearly triple the 1975 market.

Imports

Primarily as the result of an aggressive sales approach, Japanese suppliers lead in the sales of electromedical equipment, with a 1975-share of 49% of the market. United States suppliers were second with 29%, and West German suppliers sold 16%. Indonesian medical equipment users generally express dissatisfaction with the durability of Japanese equipment. This attitude is expected to result in fewer Japanese sales and more purchases from U.S. suppliers. Japanese suppliers also predominate in X-ray equipment; however, it is expected that Indonesian buyers increasingly will turn to higher quality European and

Table 6.—Indonesia: Size of the Market for Medical and Health Care Equipment
(thousands of U.S. dollars)

	1973	1974	1975	1976	1980
Electromedical Equipment					
Domestic Production	—	—	—	—	—
Imports					
United States	36	130	215	480	2,600
West Germany	50	170	120	—	—
Japan	260	210	370	—	—
Denmark	4	2	10	—	—
United Kingdom	3	2	10	—	—
Switzerland	2	1	5	—	—
Others	10	15	20	—	—
Exports	—	—	—	—	—
Total	365	530	750	1,330	5,370
X-Ray Equipment					
Domestic Production	—	—	—	—	—
Imports					
United States	35	320	180	700	1,470
West Germany	165	540	400	—	—
Japan	95	190	850	—	—
Netherlands	135	110	420	—	—
Spain	25	30	40	—	—
Denmark	5	90	110	—	—
Others	100	20	100	—	—
Exports	560	1,300	2,100	2,760	5,810
Other Medical and Dental Instruments and Equipment					
Domestic Production	—	—	—	—	300
Imports					
United States	930	1,660	2,100	2,600	5,470
West Germany	2,300	2,100	2,200	—	—
Japan	1,200	1,500	1,630	—	—
Netherlands	360	260	330	—	—
United Kingdom	100	300	325	—	—
Switzerland	55	90	95	—	—
Others	100	130	170	—	—
Exports	—	—	—	—	—
Total	5,045	6,040	6,850	7,930	15,500
Total Market Size	5,970	7,870	9,700	12,020	26,980

Source: Official Indonesian and supplier statistics and estimates based on trade source interviews.

American equipment, and sales by U.S. suppliers should increase about 8% in 1976 to about 25% by 1980.

In sales of other medical and dental equipment, such as furniture, laboratory items, and surgical apparatus, West German suppliers hold a narrow lead over U.S. companies with 32% and 31%, respectively; with Japanese sales at 24%. U.S. companies are expected to take a leading position in sales of this equipment by 1980, increasing their share to 35%.

Medical disposables are predicted by many to be of great interest in coming years. Preferences in this field are not yet established, and the market opportunities for U.S. suppliers are considered high.

Domestic Manufacturing

Indonesian production of medical and health equipment is insignificant. A few shops at the cottage-industry level make small hand instruments and made-to-order furniture for waiting rooms and small

clinics. There is also limited production of glass products, such as laboratory equipment and containers for the pharmaceutical industry. Some trade sources suggest that assembly of medical equipment might be feasible in Indonesia, but presently no specific plans exist for such assembly. There are no Indonesian exports of medical equipment, and none are expected for the foreseeable future.

MARKET OPPORTUNITIES

Government expenditures for medical equipment will focus on basic clinic supplies to equip newly constructed health centers. Purchases in this category will include basic clinic furniture, medical instruments, and accessories such as autoclaves and sterilizers. Second-level equipment, such as small X-ray units and equipment systems for a basic laboratory, will also be purchased. This second-level equipment will be more in demand over the remainder of the current national 5-year plan with the spread of electrification and increasing availability of trained personnel. Availability of electricity will also open the market for blood bank equipment, which is regarded as a high-priority requirement.

An opportunity exists for advanced laboratory equipment sales to both the Government and private medical sectors. Many hospitals and clinics are planning expansions of their laboratory facilities, including the purchase of timesavers such as electronic blood analysis instruments. Purchasers will consider not only the saving of time, but also the ability to get accurate results from undertrained technicians in understaffed facilities; most sales will be of simple, easily operated types. In addition, there is a long-range plan for each of the provincial hospitals to become a research center for a particular specialty. The hospital in Medan, for example, is to begin operation of a cancer research center by the end of 1977, and funds have been budgeted for this purpose. Provincial hospital laboratories are not equipped to handle in-depth research, and extensive planning and purchasing will be necessary. Another factor behind the move for more elaborate laboratory facilities is the increasing number of highly trained physicians and laboratory directors, many of whom express frustration in working with equipment which is below the level of the technical requirements for the job.

Medical disposables represent another area of growing sales potential in Indonesia. These items are attracting the interest of the private hospitals and the rural health program staffs. Private hospitals have become increasingly concerned over postoperative and other hospital-related infections, which are significantly reduced through the use of disposables. In the rural health program, the interest is related to sanita-

tion and ease in moving from location to location. If costs of disposables are competitive with those of multiple-use items plus the necessary sterilization equipment, large purchases will become a reality in the near future.

The majority of Indonesian hospitals and clinics have older, fairly standard furniture items and consider them quite adequate. With the exception of some of the better endowed private hospitals, purchases of furnishings will be minimum for the next few years. Indonesian medical authorities express interest in various air-conditioning and filtering systems for hospital operating rooms and intensive care areas. If funds are available, this interest could promote important purchases by the end of the current 5-year plan in 1979.

There is only limited sales potential for mobile clinics at the present time. Although mobile clinics would seem to offer a better distribution system for health care, their use is practical only in limited situations, because of the inadequacy of the Indonesian highway network. In remote areas, the population is unfamiliar with closed clinical vehicles and this would decrease their usefulness. Jeep-type vehicles equipped to set up mobile field clinics offer a better possibility, and in mid-1976, the U.S. Agency for International Development was considering a program for the acquisition of 80 to 100 such vehicles.

New equipment apparently holds a fascination for medical personnel in Indonesia, and practically all new developments are reported to bring a rash of inquiries to agents and suppliers. In 1975, for example, both requests for information and sales of cryo-surgical equipment increased rapidly, but have fallen off in 1976.

Three other medical areas that offer sales opportunities are medical and health education aids, water supply systems, and hospital management services.

Educational aids include all varieties of charts, models, filmstrips, videotapes, and the necessary audiovisual equipment for presentations on nutrition, water and sanitation, and family planning, as well as general health, first aid, and medical instruction. The Indonesian Department of Health is planning methods to utilize the new communications satellite for education and health instruction. Both program preparation and film packs would be useful, and interest was expressed in such items having an appealing style, such as cartoons which attract and hold attention and are more easily dubbed with another language.

Water supply systems include filtration equipment and all systems for providing sources of pure drinking water. Expenditures will cover everything from central systems for entire communities to 14,000 hand pumps for wells. In this field, technical assistance would be of value in marketing equipment.

Hospital management consulting service is a future market possibility, as both the Indonesian Government and private institutions are concerned over losses due to inefficiency. Consultants from WHO are working with the public hospitals in this field, and according to local sources, there is also a growing interest in the private sector.

IMPORT PROCUREMENT

Buyers Universe

The three main market segments in this sector are the Government, private medical facilities, and charitable organizations and foundations. Government purchases account for at least 60% by value of all sales. Most government expenditures go for large quantities of basic supplies and equipment, with occasional purchases of highly specialized items. The major portion of purchases by private medical institutions has been of more advanced items, such as dialysis machines. Charitable organizations, which previously supported a significant part of equipment purchases have reduced activities in recent years, and the majority of grant and aid funds are now being spent on personnel and technical assistance.

Government purchases follow three channels, depending on type and value of items and also, to some extent, on the end user. The vast bulk of standard medical supplies and equipment needs are purchased by tender through the Ministry of Health by the Directorate responsible for supervision of the end user. For example, needs of the hospitals are cleared through the Directorate of Hospitals, and requisitions for the Rural Health Program go through the Directorate-General of Family Health. More responsibility for this type of purchase is shifting to the provincial level.

The second government buying channel covers equipment purchases beyond everyday usage items and includes both expansion and replacement items. In this instance, the local end user draws up a yearly budget and indicates equipment needs, based on the long-range planning done by the local institution and at the provincial and national levels. A purchase requisition is then submitted to the Provincial Health Department for clearance and purchase. Although an end user can request brands and preferred models, the actual purchaser is the Provincial Department of Health.

The third government sales channel includes minor equipment needs. Hospitals and other health agencies have authorization to make immediate purchases of items up to approximately \$250. (Reportedly, one or two of Jakarta's larger hospitals directly buy all their equipment and supplies.)

Most minor equipment for Department of Public Health programs is presently purchased at the national level, with provincial departments taking continually greater responsibility. By the end of the current national 5-year plan in 1979, the majority of provinces will handle their own purchasing and equipment planning, which will increase coordination of single purchases for both hospital and health center use.

A separate military purchasing department buys equipment for the military hospitals, but it still comes under the supervision of the Directorate of Hospitals and follows the same general procedures outlined above.

Private hospitals and clinics are usually managed by one medically trained person who serves as both Medical Director and Administrator, and all planning and purchasing is done by that individual. In these facilities, budgets are often extensive and competition for the private patient is keen enough that the latest equipment is often required for business reasons. In private company medical facilities, such as Caltex (Sumatra) and the Arun gas field site of Bechtel (Sumatra), purchasing procedure is similar to other private institutions and directed toward providing Western standards of medical care. However, at the initial stages of such projects, purchasing is often done in the country of the foreign investor. Plantation medical facilities usually provide the minimum of necessary care and, therefore, limit their equipment purchases to functional necessities.

Charitably sponsored private institutions have a method of purchasing that is not available to other organizations. Although they buy primarily through a single administrator, major items are sometimes obtained as grants, or as so-called "gifts," through their parent organizations or other interested sponsors. In the case of an outright gift, the equipment is requested by the local institution but is purchased by, and in the country of, the sponsoring organization. Because there is no duty on medical items classified as gifts, this route is sometimes taken to purchase items at a savings to the local institution. The item is shipped and marked "gift" by a foreign sponsor, who is then reimbursed through other channels.

Other government offices influence purchasing by proposing projects to the national planning authority (BAPENAS) for inclusion in the 5-year and annual national plans, and through the assignment of special projects to particular institutions. For example, if a provincial hospital is assigned a specific research project, some equipment purchases may be made through the Department of Health, Research, and Development.

When planning major purchases or expansion, most government hospitals rely on their own staffs to

provide the necessary guidance, with people from the central government offices available for advice if requested. Some of the modern private facilities, such as Caltex and Pertamina have used consultants in both initial and expansion planning. Although local equipment representatives usually provide only minor consulting services, they can call on their principals to send consultants if a prospective buyer so requests.

Foreign Suppliers Universe

The single most important factor in the purchase of medical equipment appears to be the country where the buyers did their medical training.

Medical equipment from all over the world is sold in Indonesia, but the five major sources dominating the market are: West Germany, the Netherlands, Japan, the United Kingdom, and the United States (see table 7). Equipment from China is beginning to make a significant appearance, especially in the outlying regions. There are several large multinational firms, such as Philips of the Netherlands and Siemens of West Germany, who carry a wide range of medical equipment and ship both from their home office and from worldwide regional centers. The scope of their operations allows them to assemble system proposals, such as a Philips' basic health clinic system for government and turnkey hospitals. Many smaller firms specialize in one field of equipment, such as Scientific Atlanta (USA) with electronic equipment, Cenco Instrumenten (Netherlands) with laboratory equipment, and Medicoach (USA), mobile medical units. These firms usually ship from their home country.

European companies, primarily that of Siemens and Philips, have a longstanding reputation for making equipment of high quality and durability. These companies have well-established firms located in Indonesia, carry extensive stock and parts, know the purchasing channels and the people who are responsible for decisions, and have many well-trained Indonesian staff members. In addition, many of Indonesia's older physicians are European trained and oriented and express high confidence in European equipment.

Salesmen from German suppliers are known for regularity of calls and continuity of service and cover Indonesia thoroughly. Small outlets in Northern Sumatra, for example, are as familiar with German products as are major agents in Jakarta. Prices of German items, which previously were considered high but in line with quality, are reported to be coming down in relation to prices of competing products. A recent problem, however, has caused customers to become wary of items marked as manufactured in West Germany. Apparently, some West German manufacturers are subcontracting work to socialist countries and marketing the items under their own

Table 7.—Leading Foreign Suppliers of Health Care Equipment

Medical and Laboratory Equipment	
Griffin & George	United Kingdom
P.M. Tamson	Netherlands
Aimshield Hasboro	United States
American Instrument Company	United States
August Sauter	West Germany
Burrows Equipment Company	United States
Nasco Matheson	United States
Negretti & Zambra, Ltd.	United Kingdom
Ogawa Seiki Company, Ltd.	Japan
Soiltest, Inc.	United States
Van Water & Rogers	United States
Wedag	West Germany
Medical Testing Equipment	
Buehler, Ltd.	West Germany
Karl Deutsch	West Germany
Maruto Testing, Inc.	Japan
Testing Machine, Inc.	United States
Tinius Olsen	United States
C.S.I.	Netherlands
Electronic Testing Equipment	
Automation Peekel NV	Netherlands
Bruehl & Kjaer	West Germany
Dumont Oscilloscope	United States
Scientific Atlanta	United States
Wandel U. Goltermann	West Germany
White Electronics	United States
Medical Instruments and Equipment	
Barbier, Bernard & Turrene	France
Birtcher Corporation	United States
Medicoach	United States
Ohio Medical Products	United States
Picker International	United States
Storz	United States
Sybron Corporation	United States
Travenol Laboratory	United States
Zimmer	United States
Surgical and Laboratory Instruments	
Aesculap Werke AG	West Germany
Cenco Instrumenten	Netherlands
Medical and Laboratory Glassware	
Corning	United States
Glasswerk Wertheim ORD	West Germany
Electromedical Equipment	
Philips	Netherlands
Siemens	West Germany
Nihon Kohden Kogyo and Co., Ltd.	Japan
Shimazu	Japan
Medical Teaching Equipment	
Wener Degener	Germany
Dr. Max Clements	Germany
Dental Products	
Amalgamated Dental Trade	United Kingdom
S.S. White, Ltd.	United Kingdom
Tokyo Dental Industrial Company	Japan
Other Medical Equipment	
Aimshield Hasboro	United States
Calbiochem	United States
Ferrosan	Denmark
Ansell	Australia
Ambu International	Denmark
Down Bros. and Mayer and Phelps, Ltd.	United Kingdom
Eschmann Bros. & Walsh, Ltd.	United Kingdom
AB Electrolux	Sweden
Penlon, Ltd.	United Kingdom
Sherwood Medical Industries	United States
Varimex	Poland
Alcon Universal, Ltd.	United States
Dynatech Singapore Pte., Ltd.	Singapore
Unovex	Denmark

labels; complaints are being expressed about poor workmanship and lower quality materials, and if this practice continues, it may seriously hurt West German sales.

Japanese equipment has been selling well due to relatively low costs and persistence of sales people. However, end users are now expressing difficulties with Japanese items wearing out faster or breaking down more frequently than their Western counterparts, and they are also expressing dissatisfaction with lack of follow-up service.

Equipment, basic instruments, and medical furniture from China began appearing with regularity in the early 1970's, with more impact in the outlying regions than in Jakarta and the rest of Java. In outlying regions, lower cost is a major factor both for the supplier, who can afford to stock more equipment, and for the buyer, who usually does not have the income of his urban colleagues. Distributors of Chinese equipment have a minimum of permanent sales personnel, who usually visit an area and hire local sales people on commission to supplement their forces. They normally carry a few samples of instruments and catalogs for orders of other items.

Marketing Factors

Medical and health equipment enters Indonesia through established representatives, most of whom have franchise arrangements with overseas manufacturers, and by direct sales by the manufacturers through tender on large purchase projects. Significant quantities of equipment also enter Indonesia quasi-legally from Singapore, Taiwan, and Hong Kong, where they are purchased by freelance agents and then resold in Indonesia at lower than the franchised cost. Agents and representatives have had many disagreements over direct manufacturers bidding practices and sales to freelance agents. Indonesians place a high value on the relationship of manufacturers with both their agents and their customers, and also on the quality and guarantees that are part of equipment purchases.

Six to eight major companies are represented in Indonesia, including Siemens and Philips. Some representatives, in addition to maintaining a Jakarta office, distribute their lines through a series of combination supply outlets throughout Indonesia. A number of these outlets are owned by the Jakarta-based agent and others are independent operations which purchase supplies from several agents. These outlets, or distributors, stock standard, daily-use medical equipment such as hypodermics, basic instruments, small microscopes, films, and chemicals, while items stocked in Jakarta or outside of the country are ordered from catalogs. There are 25 to 30 other representatives of three main types: (1) Medical equipment specialists who carry a wide range of health care equipment and a variety of brands; (2) Specialists in one field, such as ophthalmic items or laboratory instrument; (3) Trading companies who

carry several lines of medical supplies along with a wide variety of nonmedical products.

Most sales to private health facilities and private physicians go through representatives in Indonesia, with some special equipment purchased through catalogs or by direct purchase in Singapore. Physicians often purchase for years from a specific agent, who sometimes acts as an intermediary for equipment purchases other than the lines for which he is a recognized representative. Since private equipment purchases are the direct responsibility of the administrator of the institution, sales personnel should approach the administrators.

Charitable organizations and foundations purchase equipment both in Indonesia and in the home country of the sponsoring organization. Sales personnel can approach these institutions in both locations. Often a sales representative in Indonesia ascertains the needs and plans of the local organization and presents his proposal to them with the suggestion that they specify their preferences to the sponsoring organization. Representatives having offices in the home country of the sponsors follow up these calls with a direct proposal to the sponsoring organization.

Sales to the Government are made by tender, by unsolicited proposals, and by direct approaches to the business administrators of the various institutions. Information on upcoming tenders and projects is available from the Ministry of Health. Equipment for government programs is sometimes purchased directly by assistance programs (such as U.S. AID), and proposals go directly to them.

Manufacturer's financing proposals vary a great deal for the purchase of medical equipment. The Japanese often require cash payments from sales representatives, while firms from Western countries often provide terms from 3 to 6 months, depending on the amount of the sale and the longevity of the relationship with the local buyer or supplier. However, most sales representatives require cash within 30 days from the end user, except in the case of major purchases by tender. Some sales representatives report that U.S. financing has become tighter on purchases of larger items and is no longer competitive.

Delivery time also varies a great deal and sometimes is the deciding factor in equipment purchases. Delivery from Germany and other European countries takes 2 to 3 months, while shipments from Japan often arrive within 2 weeks. Shipments from the United States can take as long as 5 to 6 months; some small items sent by air, special delivery, arrive in about a month. Delivery problems also affect the availability of spare parts. Established representatives carry a supply of the most common items and

use airmail to get small, nonstocked pieces. However, a 5- to 6-month delay in delivery of a critically needed medical equipment part will result in reduced future sales to the same end user.

Import duty on most medical, dental, surgical, and laboratory equipment is 10%, ad valorem, while the duty rate on electromedical apparatus and therapy equipment is 20%.

Training of personnel in the use of new medical equipment is usually provided by sales personnel. The manufacturer often trains the local supplier's sales people and/or technicians, who in turn train the end user's personnel. If complications arise, most Western manufacturers support sales personnel with additional training. For highly technical medical equipment, manufacturers either send instructors to work with future operators or hold special 2-week to 3-month training sessions in Asia or the home country. Indonesian end users express considerable criticism of Japanese suppliers for not providing training and other aftersales services.

In addition to the necessary regular calls to medical equipment buyers by sales personnel, several other sales techniques are considered to be effective. Promotional activities, such as hospital or hotel meeting room demonstrations or film presentations to a hospital staff, are effective in selling new types of equipment and applications to busy physicians at their place of work or in a relaxed hotel atmosphere.

Equipment exhibitions in conjunction with professional meetings and medical conventions are very successful methods of sales promotion in Indonesia. In addition to the Ikatan Dokter Indonesia (I.D.I., The Indonesian Medical Doctors' Association, Jl. Sam Ratulangi, 29, Jakarta), practically every medical specialty has its own national association and annual convention. These conventions are well attended, and in cases where exhibitions and meetings have been held simultaneously, both attendees and exhibitors report interest and satisfaction. Members of the Congress of Dental Surgeons report the success of exhibits at their recent convention where the manufacturers worked with their local representatives in arranging presentations.

Medical equipment is exhibited at the annual June-July Jakarta Fair. However, both end users and sales representatives agree that a trade exhibition not related to a professional meeting or convention is not an effective sales tool in the Indonesian medical sector. In addition, advertising in professional journals is effective sales promotion. The magazine *Asia Medicine*, published in Hong Kong, for example, is respected and widely read by both medical and administrative personnel in Indonesia.

COMPETITIVE POSITION OF U.S. SUPPLIERS

American medical equipment is held in excellent regard in Indonesia, and end users generally express their feeling that the high levels of health care and medical technology in the United States have produced very advanced and reliable equipment. It is also considered prestigious to own American equipment. Most U.S. firms sell through the larger, well-known, established sales representatives and support their equipment sales with good service guarantees.

Many Indonesian physicians, educated in American universities, now hold responsible decision-making positions in Government, hospitals, and medical institutions. Many other administrators in medical services have attended various seminars and training programs in the United States. Because much of the medical equipment supplied by the United Nations and various church and charity organizations in the past was obtained in the United States, there is a considerable amount of American equipment throughout Indonesia. Medical personnel are familiar with these items and appreciate the quality and the durability of the equipment with which they work.

Many Indonesian medical specialists, however, describe American market promotion and sales effort as very limited. This lack of sales effort by American medical equipment suppliers has led to some misconceptions about availability and pricing. "Why don't Americans export much medical equipment?" was the question one medical specialist asked. Another comment was, "Yes, I've seen American equipment in hospitals and clinics, but anything as good as that must be terribly expensive." A medical equipment distributor in North Sumatra had never seen either an American salesman or an American equipment catalog!

Delivery time does not seem to be a problem for suppliers of American medical equipment, although some Indonesian sales representatives suggest that it would be improved by maintaining regional stocks in locations such as Singapore.

American manufacturers have a reputation for directness and honesty in their dealings with Indonesian sales representatives. Generally, none of the criticism for undercutting local representatives by direct sales, which is often expressed concerning European and other suppliers, is aimed at U.S. firms.

With a good reputation in equipment quality and working relationships, American medical equipment manufacturers should be able to increase their sales and market share considerably by making stronger marketing efforts. Probably the most effective method

would be a somewhat different approach to each of the major groups of medical equipment end users.

The consensus of most Indonesian sales representatives is that the largest potential for future sales is the Government. A successful approach to the Government would be formation of a sales consortium of several U.S. suppliers, which could offer entire medical equipment systems. One such successful proposal would be a basic health clinic system, while another would be a basic laboratory system including options. Siemens of West Germany has, in fact, offered the Government a basic laboratory system made up of equipment from several countries, including the United States, to suit Indonesia's particular needs. One medical specialist gave some advice on system sales in Indonesia, after waiting 3 months to use his newly purchased equipment: "A package deal here must really include **everything**. The simple bolts and washers that the installing contractor usually supplies are just not available here. Your corner hardware store with the right size screw might be hundreds of miles away!"

The most effective approach to the majority of private purchasers is probably a continuation and expansion of the present sales efforts. Films and technical seminars for hospital staffs and selected groups of doctors have been very successful sales tools, and exhibits at medical conventions offer an interested and important end-user audience, even with a minimum of publicity groundwork. Equipment exhibits also have the advantage of permitting comparison shopping. Another important market development recommendation is for suppliers to provide increased training in equipment use. "People here are eager to learn," said one Indonesian medical equipment sales representative. Another said that increased training programs "... Would sure help my business." As the level of technology of medical equipment increases, the ability to provide training for hospital personnel will no longer be an option. In order to make continued sales, suppliers will have to provide for the training of technicians who will be using the equipment.

A major recommendation for American medical equipment suppliers to effect increased sales in Indonesia is to expand direct sales contracts. "We don't have time to find them, so they must find us," said one Indonesian physician. A laboratory director said, "When I need a piece of equipment, I look at what is readily available, both from nearby suppliers and in pamphlets that salesmen have left." In addition, both physicians and sales representatives spoke of the necessity of backing up expanded sales with readily available service and technical assistance.

Metallurgical and Metalworking Industries

Both primary metal production and metal products fabrication in Indonesia have grown rapidly in recent years. Production goals in the current national development plan (Repelita II, 1974/75-1978/79) have already been exceeded in a number of cases. However, demand has not risen as fast as production for a number of items such as reinforced concrete bar and pipe, causing some plants to operate below capacity.

Investment in the Indonesian metals industries continues at a high level, paced by two major projects, the Krakatau steel complex in West Java and the Asahan aluminum smelting project in North Sumatra. Although the Krakatau project is well underway, the Asahan project is still in the survey and initiation stages.

Sales of equipment for the Indonesian metallurgical, and metalworking industries in 1975 included \$18 million of metallurgical and primary metals production equipment, \$20 million of machine tools and equipment for metal products manufacturing, \$7 million of welding equipment.

Leading suppliers of primary metals production equipment include Japan and West Germany. In sales of machine tools and metals fabrication equipment, suppliers from Taiwan, the People's Republic of China, and East European countries have strongest positions. Many Indonesian users and sales representatives are not familiar with either American metallurgical equipment or machine tools.

PRIMARY METALS PRODUCTION

Iron and steel

There is no smelting of iron and steel from ores originating in Indonesia. Imported pig iron, stock and/or scrap metal are used by 77 Indonesian plants to produce reinforcing bars, wire or rod, and pipe. In 1975, these plants had a total production capacity of approximately 1.5 million tons of iron and steel products. The group with largest production capacity is made up of 31 concrete reinforcing bar plants, which have total production capacity of 926,550 metric tons per year, followed by the 15 wire and rod plants with a combined capacity of 191,500 met-

ric tons per year, 18 pipemaking plants with a production capacity of 174,000 metric tons, and 13 plants which produce galvanized iron sheets used for roofing with a total annual capacity of 170,000 metric tons.

Manufacture of steel products has increased rapidly in recent years from 14,957 metric tons in 1970 to 489,000 metric tons in 1975. Actual production of steel products in 1975 was far below capacity, which was about 1.5 million metric tons. For many plants this was planned, since they were originally built with excess capacity for future market expansion. However, some plants grossly overestimated market demand and thus suffer from the expense of excess capacity.

Steel Reinforcing Bars.—Most of the 31 concrete reinforcing bar plants use scrap iron or billets as raw material. Open hearth blast furnaces, cupola converters, and electric arc furnaces are used by these plants. Between 1970 and 1975 reinforcing bar production increased from 4,500 metric tons to 115,000 metric tons. This growth was reflective of the continually expanding building industry and the replacement of imported reinforcing bars with locally produced products. Indonesian manufacturers and their annual production capacity in thousands of metric tons are:

P.T. Air Baja (Jakarta)	100.0
P.T. Jakarta Iron Product (Jakarta)	15.0
P.T. Rakata Baja (Jakarta)	16.0
P.T. Wuhan (Jakarta)	8.4
P.T. Ancol (Jakarta)	3.4
P.T. Pyramid (Medan)	12.6
P.T. Growth Sumatra (Medan)	11.9
P.T. Irosteel Works (Jakarta)	51.5
P.T. Interworld (Jakarta)	18.0
P.T. Waru Jaya (Surabaya)	10.5
P.T. Gunung Gahapi (Medan)	9.5
P.T. Jatim Utama (Surabaya)	17.5
P.T. Aneka Logam (Surabaya)	5.2
P.T. National Union Steel (Jakarta)	8.5
P.T. Tobusco (Jakarta)	60.0
P.T. Master Steel (Jakarta)	40.0
P.T. Pulo Gadung Steel (Jakarta)	50.0
P.T. San Iron (Jakarta)	15.0
P.T. Maxi Fero (Jakarta)	40.0
P.T. Hanil Jaya (Surabaya)	40.0
P.T. Birawa (Surabaya)	6.0
P.T. Serniwa (Ujung Pandang)	12.0
P.T. East Indonesian Steel (Ujung Pandang)	10.0

P.T. Pambangunan Inti (Cirebon)	30.0
P.T. Budhi Dharma (Jakarta)	80.0
P.T. Jakarta Kyoci Steel (Jakarta)	30.0
P.T. Krakatau Steel (Cilegon)	120.0
P.T. Inti General Jaya (Semarang)	40.0
P.T. Gunung Bahara (Medan)	5.5
P.T. Toyogiri (Tangerang)	40.0
P.T. Limajaya (Tangerang)	20.0

Light Gage Sheet.—Light gage sheet production is mainly concentrated in zinc galvanized sheet output. There is no cold rolling of sheet steel in Indonesia. Zinc galvanized sheet manufacturers import cold rolled sheets and coat or dip them; a few plants reroll sheets prior to galvanizing. Production between 1970 and 1975 increased from 8,500 metric tons to 250,000 metric tons. Leading producers and their annual production capacity in thousands of metric tons include the following firms:

P.T. Lion Metal Works (Jakarta)	15
P.T. B.R.C. Lysaght Indonesia (Jakarta)	15
P.T. Sinapat Coy Ltd. (Jakarta)	15
P.T. Tobapro (Jakarta)	12
P.T. Aneka Jakarta (Jakarta)	15
P.T. Pulo Gadung Steel (Jakarta)	12

Other manufacturers include P.T. Fumira, P.T. Gandus Steel, P.T. Industri Baja Garuda, P.T. Keris Mas-Sukses, and P.T. Tumbak Mas in Jakarta; P.T. Amien Steel Works Co. Ltd., Surabaya; P.T. Polyguna Nusantara, Padang, West Sumatra; P.T. Intan Nasional Iron Industry, Medan, North Sumatra; P.T. Semarang Djaja Sakti, Semarang, Central Java; and P.T. Sermani Steel Corp., Ujung Pandang, South Sulawesi.

Wire and Rod.—Significant wire and rod production started in 1973, reached 15,000 metric tons in that year. By 1975, 30,000 metric tons were being produced, using imported bars or rods. Leading producers and their annual production capacity in thousands of metric tons are:

P.T. Krakatau Steel (Cilegon)	30
P.T. Iron Wire Works Indonesia (Tangerang)	18
P.T. Universal Metal Works (Jakarta)	42
P.T. Dunia Metal Works (Jakarta)	3
P.T. Aneka Metalin (Jakarta)	3
P.T. Tunggal Sakti Jaya (Jakarta)	2
P.T. Sumber Baya Makmur (Jakarta)	3
P.T. Adhikarta (Jakarta)	3
P.T. Sumisari Manufacturing Co., Ltd. (Jakarta) .	3
P.T. Semarang Iron Steel Works (Semarang)	10
P.T. New Simo Mulyo (Nisiyo) (Surabaya)	18
P.T. Surabaya Wire (Surabaya)	12
P.T. Sidoardjo Universal M.W. (Surabaya)	30
P.T. Intan Nasional Iron Indonesia (Medan)	12
P.T. Golcon (Medan)	2

Pipe and Tubing.—Production of both construction pipe and industrial pipe grew from 1,957 metric tons in 1970 to 94,000 metric tons in 1975. In addition to production of steel pipe for gas, water, and construction, a number of firms manufacture light gage steel pipe for use in bicycles, furniture, and other similar products (see table 3). Leading pro-

ducers and their annual production capacity in thousands of metric tons are:

P.T. Bakrie & Brothers	
(Jakarta)	21,000 (industrial)
	21,000 (light gage)
P.T. Inastu (Bandung)	21,000 (industrial)
P.T. Pabrik Pipa Indonesia	
(Jakarta)	21,000 (industrial)
P.T. Bumi Kaya (Jakarta)	21,000 (industrial)
	6,000 (light gage)
P.T. Indonesian Steel Tube	
Works (Semarang)	12,000 (industrial)
	6,000 (light gage)
P.T. Steel Pipe Indonesia	
(Surabaya)	12,000 (industrial)
	6,000 (light gage)
P.T. Kakatau Hoogovens	
International Pipe Industries	
(Cilegon)	15,000 (industrial)
P.T. Aneka Jakarta (Jakarta) ..	6,000 (light gage)
P.T. Sinar Tangerang	
(Jakarta)	6,000 (light gage)
P.T. Pipa Mas (Surabaya)	6,000 (light gage)
P.T. Rajin (Surabaya)	6,000 (light gage)
P.T. Raja Besi (Semarang)	6,000 (light gage)
P.T. Johan Trading Company	
(Medan)	4,000 light gage)
P.T. Carl Steel (Semarang)	2,000 light gage)

The Talang Tirta Plant of P.T. Bakrie and Brothers in Jakarta is a leading steel pipe producer. The plant produces galvanized steel pipe of ½ to 4 inches in diameter. Total original investment in the facility was about \$2 million. Production capacity is 21,000 metric tons annually on a three-shift basis while actual production averages about 12,000 metric tons per year. Hot-rolled steel strips in the form of coils are used as raw materials. Machinery used includes forming and high frequency welding machines from Mannesmann-Meer and Siemens-Suckert Werks of West Germany and galvanizing equipment from Brockmann and Bundt, also of West Germany.

Steel Industry Development.—Indonesia does not have sufficient quantities of all the basic raw materials for iron production, however, it does have sufficient quantities of limestone, natural gas, and oil. While iron sand is found in Indonesia, and is being exported from Cilacap, Central Java, it must be processed with high-grade iron ore into pellets before having practical value. Coal, available in the Ombilin and Bukit Asam mines in Sumatra, is not suitable for processing into conventional metallurgical coke. Some magnetic iron ore is found in Lampung, Sumatra, Southeast Kalimantan, North Sumatra, and Flores. Laterite ore is found in South Kalimantan and Sulawesi. However, neither ore type exists in sufficient quality or quantity for economic production of iron and steel.

Indonesia is dependent on imports to meet basic iron and steel requirements, including billets, bars, rods, sheets, and pig iron. Indonesian Government estimates place 1974 consumption at 950,000 metric

tons, of which two-thirds were imported. About 80% of imports came from Japan.

Since the 1950's the Indonesian Government has been trying to promote a basic steel industry, but until recently government economic plans were either unrealistic or not high enough in priority. Prior to 1965 three steel projects were planned by the Government, one to be located in Lampung, South Sumatra, one in Kalimantan, and one in West Java. The Lampung steel plant project, which was intended to produce 35,000 metric tons of pig iron annually, was dropped because an Indonesian geological survey team found that the iron ore deposit, originally estimated at 2 million metric tons, only amounted to about 400,000 metric tons. Another project was planned for East Kalimantan and was designed to produce 250,000 metric tons of steel ingot annually. The plant was to be financed by a loan from the Soviet Union, and although an initial geological survey indicated large deposits of hematitic iron ore, lateritic iron ore, and coal, the findings were found later to be incorrect. A shortage of funds also halted further progress on this project. The third steel plant planned during this period was to be located at Cilegon, West Java to produce 84,000 metric tons of rolled steel annually. This plant was also to be financed by a loan from the Soviet Union. Although about 25% of the plant was completed and about 80% of all equipment and machinery had arrived, work on the plant was suspended in 1966, mainly because of unfavorable political relations with the Soviet Union. In 1970, work on the plant was resumed. The original management group was replaced by a corporation called P.T. Krakatau Steel, jointly owned by the State and Pertamina, the national petroleum corporation, with total capital amounting to \$10 million.

According to the original plan, the Krakatau Steel plant was to produce reinforcing bars, angle bars, and steel wire, with a total capacity of 84,000 metric tons annually, using scrap iron as raw material and oil as fuel for blast furnaces. In 1974 a wire manufacturing unit, with a production capacity of 25,000 metric tons per year, went into production. This unit is capable of producing nail wire, zinc wire, plastic-coated wire, and wire fencing. In addition, an oxygen plant has been in operation since 1968 at a production capacity of 50 cubic meters per hour. In 1974, International Pipe Industries of the Philippines, Hoogovens of the Netherlands, and Krakatau Steel, formed a joint venture, P.T. Krakatau Hoogovens International Pipe Industries Ltd., to operate the pipe manufacturing unit, and the same year production started at an annual rate of 15,000 metric tons of spiral welded steel pipe ranging from 4 to 32 inches in diameter.

Nonferrous Metals

Mineral production in Indonesia includes tin, bauxite, nickel, gold, silver, manganese, and copper, all of which offer potential for smelting into metals. The principal smelting activity is conducted by the State-owned corporations P.N. Timah (tin) and P.N. Aneka Tambang (general mining), although there is some small-scale processing of tin, precious metals, and other ores at the cottage industry level.

Tin.—P.N. Timah has a tin smelter in Mentok, Bangka Island, which has recently been expanded to 25,000 metric tons annual capacity, and is now capable of smelting all the tin concentrates produced in Indonesia. Production in 1975 was 17,825 metric tons, up 18% from the previous year. About 800 people are employed in the unit, called "Peltim."

Commercial smelting on Bangka dates back to the beginning of the 19th century when the Dutch Colonial Government took over the tin mining industries. The old Dutch smelters used primitive low shaft furnaces (Vlaander ovens) with charcoal as a reductant, and produced tin ingots and very rich slag. After the World War II, the only smelter still in operation was at Mentok. In 1952 the Bangka Tin Mines were handed over to the newly independent Indonesian Government which began to consider the need for building a modern tin smelter in order to end dependency on Malaysian and other foreign smelters, as well as to cut freight and smelting costs. In 1959 following a site location survey, Klockner Industrie Anlagen GmbH of West Germany won an international tender for construction of a new smelter at Mentok, which was completed in 1968.

The original Klockner equipment included experimental rotary furnaces. Although the designed capacity was 25,000 metric tons, actual production never reached more than 5,000 metric tons in the initial years. After extensive research and experiments, production was raised to 12,000 metric tons of metal in 1973.

In 1972 an expansion program was initiated, which included an investment of \$4 million for three reverberatory furnaces, complete with a new refining facility for an additional 18,000 metric tons capacity. Work on the expansion was completed in 1975. In the new facility, tin concentrates are charged into furnaces operating at 1,250° centigrade where they are smelted and separated into rich slag and tin metal. The molten tin metal (about 99.8% pure) is further refined to 99.92% purity by addition of sawdust and temperature reduction to 350° centigrade, followed by oxidation by air streams blown through the tin bath. The dross is recycled into the primary smelting. The reverberatory furnace's rich slag is granulated with water jets and prepared for the secondary smelting at a temperature of about 1,350°

centigrade, and separated into hardhead (tin-iron alloy) and 1% tin end slag (discard slag). Hardhead, with 80% tin and 20% iron content, is recycled into the primary smelting.

Nickel.—P.N. Aneka Tambang built a ferro-nickel smelter at its Pomalla, Southwest Sulawesi, mine to process nonexport grade nickel ore. The 20,000 metric ton annual capacity installation began operation in 1976. The equipment, purchased from Rhein-Stahl of Germany, produces ferro-nickel ingots using a 20,000 kVA electric furnace. Aneka Tambang has plans for increasing the capacity of its smelter.

Precious Metals.—The Logam Mulia division of Aneka Tambang processes gold and silver ore mined in Cikotok and the vicinity of South Banten, West Java. Annual production capacity is 300 kilograms of gold and 5,000 kilograms of silver. The cyanide process is used for the precipitate with further refining of the ores by electrorefining equipment from Australia. Locally fabricated oil-fired furnaces are used for smelting.

METAL PRODUCTS FABRICATION

Metal products fabrication in Indonesia has grown in quantity and diversity during recent years (see table 1). Products of the industry include: heavy machine parts, automobile, motorcycles, air-conditioners, refrigerators, electric fans, rice cookers, sewing machines, diesel engines, agricultural sprayers, rice hulling machines, sugar mill equipment, concrete mixers, water pumps, road rollers, and other items.

Table 1.—Indonesia: Selected Metal Products Output
(number of units)

	1970	1971	1972	1973	1974	1975
Air-conditioners	4,500	4,750	31,480	20,000	20,000	24,000
Refrigerators ..			21,400	10,000	10,000	35,000
Electric Fans ..						128,000
Gas Braziers ...						12,000
Rice Cookers ..						11,000
Food Blenders ..						1,800
Hair Dryers ...						10,000
Sewing						
Machines	14,000	13,500	292,000	340,000	500,000	400,000
Diesel Engines .						6,000
Agricultural						
Sprayers						20,000
Rice Hullers ...						3,500
Road Rollers ..				2,500	3,000	3,500
Irrigation						
Pumps					2,000	3,000

Source: Central Bureau of Statistics, estimates based on trade sources.

Motor Vehicle Production

Motor vehicle production and assembly is one of the largest segments of the industry. Initially only the assembly of imported motor vehicle parts was ac-

complished, but there has been considerable development in local manufacture of parts. Total Indonesian production of four-wheel vehicles in 1975 was 78,873 units consisting of 30,770 sedans or station wagons, 3,081 small utility vehicles, and 45,022 buses and trucks. Between 1970 and 1975 four-wheel vehicle production grew from only 4,448 units to 78,873 units (see table 2).

Table 2.—Indonesia: Motor Vehicle Production
(number of units)

Year	Sedans and station wagons	Jeeps and the like	Buses and Trucks	Total Four-Wheel Vehicles	Motorcycles and Motorbicycles
1970	51	1,930	2,467	4,448	31,100
1971	1,790	4,724	11,109	17,623	50,000
1972	6,125	4,177	11,816	22,118	104,420
1973	15,433	2,041	19,485	36,959	151,517
1974	24,697	2,376	32,729	59,802	222,700
1975	30,770	3,081	45,022	78,873	251,000
1976 ¹	—	—	—	50,000	350,000
1977 ¹	—	—	—	60,000	450,000
1978 ¹	—	—	—	70,000	575,000

¹ Repelita II targets.

Source: Indonesian Association of Motor Vehicle Assemblers and Sale Agents, Repelita II, estimates based on trade interviews.

Manufacture of motorcycles and motor bicycles grew from 31,100 units in 1970 to 251,000 in 1975.

The Indonesian Government has encouraged local assembly of motor vehicles by charging high import duties on various vehicles and banning certain vehicle imports. The import of built-up sedans and station wagons, components for the assembly of luxury-type automobiles, and built-up commercial vehicles and motorcycles is prohibited.

Automobiles and Trucks.—Fourteen Indonesian automobile assemblers produce automobile brands from all over the world (see table 3). Japanese brands predominate, Toyota (assembled by P.T. Multi Astra) being the largest in the passenger car field with a production capacity of 36,000 units per year. Mitsubishi's Colt and Fuso brands have the highest production rate among commercial trucks and pickup vehicles. In total, 44 brands of automobiles and trucks are being assembled.

P.T. Ismac, is a joint venture between P.T. Pembangunan Jaya (the Salim Group of Indonesia/Jakarta Municipal Government) and A.B. Volvo of Sweden. The plant was inaugurated in October 1975 with an initial capacity of 3,000 sedans and 500 trucks per year working one shift. The plant's capacity will eventually be increased to 12,000 sedans and 3,000 trucks per year. Production is under the control of Volvo while the marketing is conducted by P.T. Central Sole Agency, another of the Salim Group of Companies. The assembly plant is located at the Ancol Industrial Estate in Jakarta on an area of 93,100 square meters, of which 10,000 square

Table 3.—Indonesia: Automobile Assemblers

Firm	Location	Brand Assembled
P.T. German Motors	Jakarta	Mercedes Benz, Volkswagen
P.T. Imermoter	Surabaya	Datsun, Opel
P.T. Ismac	Jakarta	Volvo
P.T. Krama Yudha Surabaya Majopahit Motors	Surabaya	Mitsubishi
P.T. Krama Yudha Ratu Motors	Jakarta	Mitsubishi
N.V. Indonesia Republic Motor Company	Jakarta	Dodge, Chrysler, Ford, Simca
P.T. Multi Astra	Jakarta	Toyota
P.T. Udatin	Surabaya	Holden
P.T. National Assemblers	Medan	Mazda
P.T. Garmah Motors	Ujung Pandang	Chevrolet, Steyer Puch, Bedford
P.T. Waha Bhakti Utama	Jakarta	Moskevitch, Vauxhall
P.T. Permormin	Jakarta	Mitsubishi
P.T. Prospect Motors	Jakarta	Honda
P.T. Java Motors	Jakarta	Landrover

Source: Trade interviews.

meters is devoted to a workshop. The plant employs 130 people and initial total investment was \$9 million. Only 10% by value of the vehicle components assembled by the plant are made in Indonesia, but plans call for the value of local content to increase. Locally provided components which will be used in the future include cell batteries and radial tires, the latter which will be supplied by the Goodyear plant in Indonesia. Plans also call for expansion of the plant to assemble buses and heavy equipment to be provided by Volvo. A cooperation program is being formulated under which Volvo will authorize the plant to produce additional vehicle components.

Automobile part production became significant in 1974 and increased substantially in 1975. In that year manufacture of parts included these items:

Item	Units
Mufflers	20,000
Shock Absorbers	25,000
Pistons	40,000
Bus Bodies	4,000

Producers of parts for motor vehicles include: P.T. Immora Honda, P.T. Kayaba Indonesia, C.V. Auto Diesel Radiator Co., P.T. Indoasku, and P.T. Nippondenso. These firms are engaged in production of four-wheel automobile parts such as: shock absorbers, wheel rims, electric parts, pistons, radiators, mufflers, brake linings, seats, fuel tanks, and body parts. Five firms have begun production of body parts, and four others have obtained licenses for such production. Body components produced include: bodies for buses, dump trucks, minibuses, taxis, and pickups.

Among the leading bus and truck body manufacturing firms in Indonesia is P.T. Superior Coach, a subsidiary of the U.S. firm, Sheller-Globe Inter-

national Corporation of Toledo, Ohio. Another important firm is P.T. Wijaya Buana, which began in 1974 with an annual production of about 50 body units. The firm produces various chassis models including those for buses, ambulances, station wagons, and dump trucks. Production costs are influenced greatly by prices of imported steel plate.

P.T. Sakai Sakti, an Indonesian-Japanese joint venture, manufactures road rollers, stone crushers, and asphalt working equipment.

Indonesian partners in the firm include: P.T. Tri Usaha Bhakti (the Army holding company) and P.T. Warga Bezi, while the Japanese partners are: Sakai Heavy Industries and Sumitomo Shoji Kaisha. The firms, equipment includes: 2 gantry cranes (3 ton and 5 ton), 1 hydraulic press (100 ton), 2 engine lathes, 1 radial drill, 1 column drill, 10 electric arc welders. The equipment is primarily of Japanese manufacture.

Production in 1975 was as follows:

Type	Units
Vibration rollers, 2.5 ton Model SV-25	8
Vibration rollers, 4 ton Model SV-40	48
Three wheel rollers, Model KD7608B and Tandem Roller Model WM7708 (8 to 10 ton) ..	52
Pneumatic Tire Rollers (Model TS-7409 (5-20 ton)	47
Stone crushers	12
Asphalt sprayers, asphalt finishers, asphalt mixing plants, etc.	8

Motorcycles.—The leading Indonesian assemblers of motorcycles include the following firms located in Jakarta: P.T. Federal Motor (Honda), P.T. Dan Motor Vespa Indonesia (Vespa), P.T. Italindo (Lambretta), P.T. Harapan Motor Sakti Corporation, P.T. Indohero Steel Engineering, P.T. Insan Apollo.

P.T. Yamaha Indonesia Motor Manufacturing is a joint venture between P.T. Karya Sakti Utama and Yamaha Motor Company of Japan. Construction of its parts and components factory was completed in late 1975 with an investment of \$10 million. The plant will employ 374 people in the first year and 558 people in the second year. The company's schedule for manufacturing of parts and components covers a 10-year period divided into five stages of 2 years each. In the first and second stages the motorcycle body will be manufactured, and in the following stages mechanical components will be produced.

Two firms located in Jakarta, P.T. Honda Federal Inc. (a joint venture between Honda Motor Company of Japan and P.T. Federal Motor of Jakarta), and P.T. Suzuki Manufacturing Co. (a joint venture between Suzuki Motor Company of Japan and P.T. Indokarmo Utama) have begun manufacturing motorcycle parts. The Honda joint venture manufactures clutch system assemblies, carburetor assemblies and chrome plating. The Suzuki joint venture manufactures air cleaners and performs die casting, plastic

moulding, and chrome finishing. Two other joint ventures, P.T. Carmay Motors and P.T. Indokaya Indonesia, both Hong Kong-Indonesian joint ventures, are expected to begin producing motorcycle parts and components in 1976-77.

Output of three-wheeled motorized vehicles was over 4,000 units in 1975. Four firms produce small three-wheeled motorized passenger vehicles. The names, location, and number of units produced by these firms are as follows:

<i>Name and Location</i>	<i>1974</i>	<i>1975</i>
P.T. Bina Logam (Jakarta)	701	3,299
P.T. Mebea Indonesia (Jakarta)	180	390
P.T. Italindo (Jakarta)	178	230
P.T. Tunas Bekasi (Jakarta)	—	300
Total	1,059	4,219

Other Metal Products

Appliances.—Refrigerator, air-conditioner, and other electric appliance production has shown growth in recent years with 1975 production estimated at 24,000 units of air-conditioners and 35,000 units of refrigerators. To encourage this growth, the import of built-up air-conditioners, refrigerators, and electric sewing machines is prohibited. Indonesian manufacturers and assemblers of room air-conditioners include the following firms:

<i>Name and Location</i>	<i>Brand and Ownership</i>
P.T. Panda Raya Electric Ltd. (Jakarta)	"Panda," General Electric of U.S. licensee
P.T. Buana First Indonesia (Jakarta)	"Premier," Indonesia
P.T. Sanyo Industries Indonesia (Jakarta)	"Sanyo," Japanese Indonesian joint venture
P.T. Yasonta (Jakarta)	"Sharp," Japanese Indonesian joint venture
P.T. Daikin Indonesia (Jakarta)	"Daikin," Japanese Indonesian joint venture

P.T. Panda Raya Electric Ltd. is a leading producer of air-conditioners and assembles the "Panda" brand of window/wall units on license from General Electric of the United States. Panda Raya Electric plans to convert its operations from assembly to full fabrication of air-conditioner parts. The firm plans to invest about \$400,000 in new metalworking equipment.

Indonesian sewing machine production reached 400,000 units in 1975. While some parts are still imported, a substantial portion is manufactured locally. Casting of the bodies, for example, is done in Indonesia. P.T. Singer Industries Indonesia, a subsidiary of Singer Inc. of the United States, assembles sewing machines at Surabaya in East Java. Production includes wood cabinets and some metal components, but metal parts are imported.

Nuts and Bolts.—There are six Indonesian producers of nuts and bolts with a total annual output of about 7,600 metric tons. The firms and annual capacity in metric tons are:

P.T. Cibinong Indah (Jakarta)	2.0
P.T. Moon Lion (Jakarta)	1.4
P.T. Metal Diameter (Jakarta) .....	.9
P.T. Sumisari (Jakarta)	2.0
P.T. Quick (Jogjakarta) .....	.9
C.V. Usaha (Bandung) .....	.4

Representative of these producers is the Jakarta firm P.T. Moon Lion, a joint venture between local Indonesian investors and the Chun Yu Works of Taiwan. The firm has slotting and thread rolling machines, headers, and other equipment, which is produced by the Taiwan partner.

Aluminum Fabrication.—Aluminum products manufacturing is a growing industry in Indonesia. There are six plants extruding aluminum items, three plants rolling aluminum sheets, and about 50 to 60 firms engaged in aluminum product fabrication (see table 4).

Table 4.—Indonesia: Aluminum Sheet and Extrusion Manufacturers

<i>Firm</i>	<i>Product</i>	<i>Capacity (tons per year)</i>
P.T. Almindo, Jakarta (Joint venture—Japan)	Sheet	10,000 to 20,000
P.T. Halco, Jakarta (Domestic investment)	Sheet	3,000 to 5,000
P.T. Indal Aluminum, Surabaya (Domestic investment)	Sheet	3,000 to 5,000
P.T. Alcan Indonesia, Jakarta	Extrusion	3,000
P.T. Intalm Works, Jakarta	Extrusion	3,000
P.T. Alexindo, Jakarta	Extrusion	3,000
P.T. Indo Extrusions, Bandung (Joint venture—Australia, U.S., Hong Kong)	Extrusion	3,000
P.T. Cassaindo, Jakarta	Extrusion	1,000
P.T. Indal, Surabaya	Extrusion	1,000

Source: Trade sources.

Aluminum billets are imported from Canada, the United States, and Australia. Extrusion presses have been imported from Vickers in Australia, and the U.S. companies Sutton Engineering and Farrell Inc. Capacity of the aluminum extrusion industry is about 14,000 metric tons per year. The majority of extrusion output is of building door and window parts; however, the firms are promoting other uses for their products. Aluminum sheet production capacity is 30,000 metric tons annually. The majority of aluminum sheet produced is utilized by manufacturers of cooking utensils.

Representative of aluminum products fabricators is P.T. Soule Aluminum Indonesia, a joint venture between Soule Steel Company of California and a local firm, which produces aluminum windows, doors, and curtain walls.

P.T. Twink Indonesia in Jakarta is a firm engaged in miscellaneous metal products manufacturing including electric overhead line hardware and cable accessories. The firm has manufacturing facilities in three buildings with about 400 employees and uses welders, lathes, punching, drilling, ball mill, and cutting machines from East Asian and European sources.

Engines.—P.T. Yanmar Indonesia in Jakarta, and P.T. Kubota Indonesia, subsidiaries of the Japanese firms Yanmar and Kubota, respectively, in Semarang, Central Java, have both begun assembling diesel engines. The engines are imported in completely knocked-down (CKD) condition and assembled for use in power generation, marine, agricultural, and other applications. Past and planned production is as follows:

P.T. Yanmar Indonesia

<i>Year</i>	<i>Number of Engines</i>	<i>Horse- power</i>
1973	2,500	5
1974	3,500	10
	1,550	15
1975	3,000	5
	4,200	10
1976	3,000	5
	5,050	10
	2,750	15
1977	4,300	5
	6,000	10
	2,700	15

P.T. Kubota Indonesia

<i>Year</i>	<i>Number of Engines (15–20 hp)</i>
1973	4,000
1974	4,800
1975	5,650
1976	6,350
1977	6,350

Aircraft Manufacturing and Repair.—About 10 firms are involved in aircraft overhaul and repair. Between 1968 and 1974 the number of civil aircraft in Indonesia increased from 57 to 386 with a corresponding increase in service requirements. Indonesian service facilities are still inadequate, however, and many planes are overhauled in Australia, Singapore, Manila, Hong Kong, and Japan.

Indonesia is gradually moving toward development of a local aircraft manufacturing industry, although it will be many years before any substantial production takes place. As a first stage toward that goal, the Government is developing the aircraft repair and overhaul industry in order that local mechanics and technicians may obtain experience and extend their skills and know-how in aircraft technology. As a second stage of development, the Government plans to encourage design and engineering services, after

which will come the manufacture of parts and components needed for overhaul and repair operations.

The important facilities for repair and overhaul of aircraft include the following:

P.N. Garuda Indonesian Airways has facilities for overhauls of 60 aircraft engines per year, including turboprop and jet engines.

POLOG AURI—Bandung (The Indonesian Air Force Logistics Section) has facilities capable of overhauling 50 engines per year.

POLOG AURI—Malang has capacity to overhaul 30 engines per year.

LPPU-CURUG (The Government Aviation Training Center) has capacity to overhaul 20 small engines per year.

P.T. Nurtanio in Bandung (see below) has a workshop for small engines and airframes.

The aircraft repair and overhaul industry in Indonesia employs about 1,750 technicians and mechanics in addition to 750 administrative staff personnel. An organization called the Indonesian Aircraft Service and Industry Association (INASIA) represents the industry.

P.N. Garuda has frame maintenance facilities for Fokker F-27's and F-28's and for Douglas DC-9's. The firm is now developing facilities for overhaul of F-27 Rolls Royce engines. Engine overhaul for F-28's and DC-9's is still undertaken by overseas contractors, such as Ansett of Australia (F-28's), Qantas of Australia (DC-9's), KLM of the Netherlands (DC-9's) and Lufthansa of Germany (DC-9's).

Merpati Nusantara Airlines has its YS-11 frames and engines overhauled by the Air Force Logistics Section in Bandung. That shop also overhauls Lockheed Hercules, Douglas DC-3's, and Grumman aircraft.

The problems faced by local air service firms include aircraft operators' lack of confidence in the quality, reliability, and punctuality of service provided by local companies; the lack of availability of spare parts; and the many different makes and types of aircraft being operated in Indonesia.

The only aircraft manufacturer in Indonesia is P.T. Nurtanio in Bandung. Formerly an air force affiliated institute, P.T. Nurtanio was established as a government-owned limited liability company in early 1976. The firm has produced small quantities of a two-seater aircraft according to a Polish design and using Continental engines. This aircraft, called the Gelatic, has been used by local operators for agricultural purposes. Recently P.T. Nurtanio completed a second prototype two-seater aircraft called the LT-200 using Lycoming engines. Plans for P.T. Nurtanio call for assembly of the Casa 212 STOL aircraft from Spain, and the BO 105 helicopter under license from Messerschmitt-Bolkow-Bohm in Germany. The firm has

started import of components for the two aircraft and technicians have been sent to Spain and Germany for training. Twenty units of the BO-105 and about 40 of the Casa 212 will be assembled in the first stage of the program. The firm plans to undertake complete manufacturing of these two aircraft in 10 years.

Bicycles.—The bicycle remains an important means of transportation, particularly in rural areas. Bicycles are manufactured by 14 firms located in Jakarta, Bandung, Surabaya, Semarang, and other population centers, primarily on Java. Output in 1974 was just over 15,000 units. Production comprises primarily assembly of imported components, although some frames are made from domestically produced tubing. Many cottage industries modify bicycles to produce pedicabs and similar conveyances.

In early 1976, a new bicycle factory owned by the Central Cooperative of Government Employees was inaugurated. The factory, located near Jakarta, was built at a cost of \$1.1 million. Initial production of the plant is expected to be 36,000 bicycles in the first year, 40,000 in the second year, and increasing to 96,000 by the sixth year. In 1976, 160 workers were employed.

Shipyards.—In 1976 there were 22 shipyards making steel-hulled ships, 46 shipyards making wooden vessels, and 87 dockyards in Indonesia. All dockyards are able to undertake floating repair work as well as manufacture of ships' equipment and fittings. The 22 shipyards making steel-hulled vessels have a total building capacity of 44,000 deadweight tons (DWT) per year plus a regular repair capacity of 1 million DWT. Actual production averages about 22,000 DWT per year for new ships and 750,000 DWT for ship repairs. Equipment is generally obsolete and in poor condition, and many shipowners rely on the more modern and efficient facilities in Singapore. In 1974, steel ship production was 17,000 DWT and ship repairs were 650,000 DWT.

P.T. Dok Tanjung Priok was founded on May 12, 1891, by N.V. Droogdok Mij Tandjoong Priok. It was nationalized and converted into a State corporation on January 1, 1961. It operates under the auspices of the Department of Communications, Industrial Directorate of Maritime Production and Services. The firm undertakes docking and repair of vessels, and construction of new vessels to 5,000 DWT.

The shipyard's area encompasses 11 hectares of land, 10 hectares of water, and it employs 1,400 workers. Facilities and equipment include:

Floating dock.—Length: 73 m. Lifting Power: 600 tons.

Floating dock.—Length: 130 m. Lifting Power: 6,000 tons.

Floating dock.—Length: 150 m. Lifting Power: 10,000 tons.

Pulling dock.—Length: 75 m. Lifting power: 1,200 tons.

Pulling dock.—Length: 20 m. Lifting power: 100 tons.

Its shipyard transport equipment includes: tugboats, 82 to 245 horsepower (hp) (5); motorboats, 20 to 23 hp (3); inspection boats, 165 hp (2); floating crane, 7 tons (1); mobile cranes, 5 to 10 tons (3); forklift trucks, 1 to 5 tons (6); cranes, 1.5 to 25 tons (5). Metalworking equipment installed includes the following: universal tool cutter and form grinder (N.V. Hembrug, Netherlands), tool grinding machine (Mape, France), milling machine, horizontal 1,200 × 330 mm (Oerlikon, Switzerland), vertical fine boring machine (Bertoni & Cetti, Italy), center lathe, 820/3,000 mm (Heidenreich & Harbeck, W. Germany), and table horizontal cutter drilling machine (Wotan Werke, W. Germany).

Work accomplished in 1974 was: annual survey—72 vessels, 127,738 gross registered tons (GRT); special survey—8 vessels, 24,544 GRT; emergency survey—49 vessels, 15,667 GRT; miscellaneous survey—18 vessels 478 GRT; floating repair—169 vessels; running repair—369 vessels; new building—6 floating barges.

Railway workshops.—The State Railway Authority (PJKA) has five mechanical workshops (including three in Java and two in Sumatra) for the overhaul, repair and maintenance of locomotives and rolling stock. The workshops include:

<i>Operations</i>	<i>City and Area</i>
Passenger cars (steel body)	Jakarta
Freight cars	Surabaya, East Java
Diesel locomotives	Jogjakarta, Central Java
General	Lahat, South Sumatra
General	Medan, North Sumatra

With the exception of the Jogjakarta shop, all the workshops are very old, with many machines still using belt-drive systems. Of the 1,600 units of repair machinery about 680 units are over 30 years old. A general shortage of adequate handling equipment, tools, and gauges exists. (Additional information on railroad maintenance and repair is included under Transportation.)

MACHINING AND METALWORKING JOB SHOPS

Numerous machine shops and foundries in Indonesia are engaged in the manufacture and fabrication of industrial machinery, equipment, and parts. Many of the larger firms developed from nationalized Dutch companies which were originally established to re-



Low-cost labor availability results in continued use of the labor-intensive methods in metal working industry.

pair plantation and factory equipment. Operated as State-owned limited liability corporations such as P.T. Barata, P.T. Boma, and Bisma Indra, they are now engaged primarily in fabrication of large steel structures, casting and machining of equipment for sugar, crumb rubber, palm oil, and tea plantations. P.T. Barata, the largest of these firms, has facilities in several locations, with the main machine shops in Jakarta and Surabaya, East Java, and smaller shops in Bandung, and Sukabumi, West Java, and Tegal, Central Java. Total employment of the firm is 3,500, including seasonal workers. Machinery at the machine shop in Surabaya includes the following, some of which is old U.S.-manufactured equipment, as well as newer units of West and East European manufacture:

Description	No. of Units
Universal milling machine	1
Radial drilling machine	1
Hydraulic press	1
Grinding machines, 150 mm	2
Grinding machine, 400 mm	1

Description	No. of Units
Universal lathe, 500×1900 mm	1
Universal lathes, 500×1,600 mm	3
Universal lathes, 350×700 mm	4
Horizontal drilling machines, 90 mm	2
Horizontal drilling machine, 125 mm	1
Vertical lathes, 1,650 mm	3
Excenter press, 125 tons	1
Mechanical press brake, 100 tons	1
Pillar drilling machine, 32 mm	1
Universal horizontal milling machine 290×1,340 mm	1
Universal grinding machine, 175×1,000 mm ..	1
Electric welders, 500 amp	4
Electric welders, 340 amp	5
Sandblasting apparatus	1
Chamber-type hardening furnace, 700×508×1,000 mm	1
Horizontal boring machines	3

Representative items produced by P.T. Barata include gear transmissions for sugar cane crushers, steam power plant structures, oil storage tanks, wax sweating tanks, heat exchangers for sugar factories, and stone crushers. Using a Yugoslav license, Barata is also producing 400 units of road rollers annually, one model of 6–8-ton size and another of 12–14-ton size. Future plans for Barata call for production of bulldozers, tractors, graders, and excavators.

As part of the plan to expand foundry operations in Indonesia, Barata has completed construction of a foundry in Jakarta and is now building another in Surabaya. The Jakarta foundry, completed in 1974 at a cost of \$1.2 million financed from Japanese credits, has a capacity of 4,000 tons of cast iron and 2,000 tons of cast steel per year, but had not yet reached that production level by mid-1976.

There are hundreds of small Indonesian machine shops which undertake repairs and custom fabrication jobs. Typical of such firms is the Bengkel Glugar shop in Medan. The shop undertakes general custom repair and fabrication for the plantations in the Medan area, and also makes rice milling equipment, coconut oil presses, etc. The firm does its own casting and forgings and machines the castings. Scrap iron and pig iron from China and India are used, as well as iron sheet, bars, angles, channels, and beams supplied from Japan. About 20 tons of steel is used by the shop each month. In the Medan area there are about 20 shops like Bengkel Glugar.

Machinery used by Bengkel Glugar includes the following:

Description	No. of Units
Milling machines, 50 cm by 1.75 m	3
Shaping machines, 12 to 24 inches	5
Radial drills, 2 inch maximum	3
Pneumatic hammer for forging	1
Slotting machine 1.5 feet	1
Lathes, 80 cm to 3 m between centers	25

The machine tools come mainly from Taiwan, the People's Republic of China, Eastern Europe (including Poland, Romania, and Czechoslovakia), and the United Kingdom.

Some American firms have started fabrication and repair of equipment for offshore oil well drilling in Indonesia. P.T. Brown and Root Indonesia, a subsidiary of Brown and Root Inc. of the United States, has a facility at Merak, West Java. On Batam Island near Singapore, Dresser Industries has received approval for manufacture of drilling bits, while Avery Laurence, a subsidiary of the Ball Corporation (U.S.), is planning to move its fabrication facilities from Singapore to Batam.

Construction of large petrochemical and other plants has resulted in considerable metalworking output at project sites. This activity, although not of a permanent nature, has a considerable impact on the machining industry as a result of the large number of machinists who are trained in such projects. For example, at the LNG plant construction site in Aceh in North Sumatra, Bechtel, the contractor, has invested \$900,000 in positioning and welding equipment and is training thousands of workers.

PRINCIPAL GOVERNMENT OFFICES

The Directorate-General of Metal and Mechanical Industries within the Department of Industry has primary responsibility for regulation of the metallurgical and metalworking industries. Within the Directorate-General are Directorates of Motor Vehicle Industry, Shipping Industry, Aviation Industry, Mechanical and Electronic Industries, and Miscellaneous Metal Industries, each of which is responsible for regulation of its respective industry segment. For primary metals regulation, the Ministry of Mines has jurisdiction over government-owned mining firms such as P.N. Timah and thus indirectly oversees tin and other smelting activities.

The Government has taken steps to develop Indonesian metals production by the establishment of the Metal Industry Development Center (MIDC) in Bandung, which is to provide training and assistance to the industry. Started in 1970, MIDC was initially financed with Belgian Government aid of \$1.6 million and Indonesian Government funding of about \$2 million. When construction of the Center was completed in April 1975, the Belgian Government made another \$4 million available for equipment and supplies, and the Indonesian Government provided an additional \$2 million. The Center, which began accepting trainees in 1973, includes smelting, welding, and testing facilities; machine tools; and other equipment valued at \$2.4 million.

The Center provides technical aid to the industry, advising on use and choice of materials and machinery, production process planning, equipment rehabilitation, improvement of welding techniques, etc. Regular seminars and courses are held at the Center. The next stage in its development will include the addition of facilities for forging, diecasting, hot rolling, metal plating, materials testing, powder metallurgy, and a chemical laboratory.

TRENDS, PROGRAMS, AND PROJECTS

Primary Metal Production

Iron and steel.—The Indonesian Government plans to develop a basic iron and steel industry despite the lack of most raw materials. Plans stress two main benefits which would result from development of a domestic iron and steel industry: foreign exchange savings, especially when a full-integrated steel mill becomes justified by the volume of the market; and increased employment of Indonesian labor. Estimates regarding future iron and steel requirements vary greatly, with one of the highest projecting a market demand of nearly 4 million metric tons by 1985. A survey completed in 1973 by three large international firms, including Hoogovens of the Netherlands, estimates Indonesian steel demand, in terms of finished products, to be 1.5 million metric tons in 1976, 2.1 million metric tons in 1979, 2.9 million metric tons in 1982, and 3.97 million metric tons in 1985, including 2.4 million metric tons of steel bars, 970,000 metric tons of steel beams, and 620,000 metric tons of pipe. Using these projections, the Government has been taking steps to prepare for the expected requirements.

The Krakatau Steel complex at Cilegon, West Java, is the key factor in the development of the iron and steel industry. The Government plans to make the steel complex, together with the existing secondary steel products facilities, an integrated steel production system in which the larger and more efficient plants at Krakatau will produce wire and pipe, galvanized iron sheet plate, and semifinished products for processing by existing production facilities. It is developing the Krakatau Steel complex and planning other large-scale steel and iron production units in the hope of avoiding the problems of quality control inherent in small-scale industries. Government officials believe they have learned from Taiwan's experience. They see Taiwanese industry as still suffering from a legacy of quality-control problems as a result of over-reliance on small ventures, and they hope to avoid this.

P.T. Krakatau Steel was established for the purpose of resuming the large-scale steel project previously planned with assistance from the U.S.S.R.

The project as resumed was to include a billet plant in the first stage and a slab plant in the second stage. Both plants were to use iron ore or iron pellets as raw materials in the direct reduction process using natural gas. The two plants were to constitute the starting point for two different kinds of steel products: the billet plant's output was to be processed into "long" steel products such as reinforcing bars for the construction industry, while the slab plant's output would be further processed into "flat" products such as steel plate mainly for manufacturing industries.

In 1972, Pertamina, the national petroleum corporation, took control of the Krakatau Steel project and began granting development contracts. However, in 1974 as a result of the Pertamina financial difficulties, overseas contract payments of \$350 million and domestic contract payments of \$53 million were in default. In April 1975 the President ordered a reappraisal of the project and the renegotiation of the contracts. As a result of renegotiation, overseas contracts originally totaling \$1.7 billion were reduced to \$935 million, while the value of domestic contracts was reduced from \$21 million to \$8 million. The revised project maintains the first stage, which provides for annual production of 150,000 metric tons of reinforcing bar, 100,000 metric tons of angle bar, 15,000 metric tons of spiral weld pipe, 250,000 metric tons of wire rod, and 500,000 metric tons of billets. However, the slab, hot strip, and iron pellet plants originally included in the second stage were canceled.

Three direct reduction units, originally planned for the second stage were moved to the first stage as were two additional 80-MW power plants. The present plans call for production of sponge iron using the direct reduction process with ores coming from Australia and gas from the Arjuna fields in Central Java.

Kaiser Engineers and Aramco Steel are acting as consultants for the project. In 1975, the Government relieved Pertamina of its duties as contract manager for the project and appointed P.T. Krakatau Steel as financial and administrative manager. The project was placed under the jurisdiction of the Directorate General of Metalworking Industries of the Department of Industry. By that time, P.T. Krakatau Steel was already engaged in production of spiral weld pipe in its joint venture with Hoogovens of the Netherlands and International Pipe Industries of the Philippines. In 1976, with the aid of experts from the Australia Wire Industries Association, production of the cold wire drawing plant was started with a capacity of 30,000 metric tons per year, using imported wire rod.

Plans call for P.T. Krakatau Ferrostahl, a joint venture between P.T. Krakatau Steel and Ferrostahl of West Germany, to build both the sponge iron and

billet plants. A European firm, Concrast is supplying the continuous casting system for the mill. Siemens of Germany is supplying the power plant. Ferrostahl, the Krupp group trading company, is the principal equipment supplier. The direct reduction process is a patented process of Ferro-Sponge of Monterrey, Mexico and is referred to as the HYL Process. Ferrostahl subcontracted with Swindell-Dressler Company of Pittsburgh, Pennsylvania, to supply equipment for the HYL process. Swindell-Dressler holds the U.S. license for the HYL process. Some equipment will come from the United States including 6,000 metric tons of refractories, catalysts, valves, pumps, and other equipment. The vessels will come from France while the structural steel and pipe for the plant will come from West Germany. In total there will be four units each of 500,000 metric tons capacity of sponge or direct reduction iron. The first unit will come on stream in February 1978, the second unit in August 1978, and the third and fourth units in the latter part of 1978. Thus by 1979 output will reach 2 million metric tons of iron. Krakatau may be the first merchant direct reduction unit in the world, since the plant will produce more than Indonesian electric arc furnaces can process into steel. Marketing studies are being conducted to identify markets for the excess sponge iron.

Despite the ambitious government efforts, doubts remain regarding the long-term viability of the project, since geological surveys indicate that natural gas supplies in the Arjuna fields will last only 20 years at the most. When these supplies run out, it will be necessary to bring liquified gas from fields in Northern Sumatra and Kalimantan. This will increase the costs considerably. Marketing excess sponge iron will also present difficulties, since the product is highly flammable and not easily transported.

The raw materials for the plant will be iron ore pellets. A total of 3 million metric tons per year will be needed for the plant. There is a world shortage of pelletized iron, and Indonesia is considering building a plant in conjunction with the Krakatau process to use the titaniferous black "iron sands" or low-grade ore available in Indonesia. Alternatively, use would be made of the 6% iron fines which will be left over from pellets brought in and not utilized initially by the steel plant. The process requires pellets low in silicates.

Nonferrous metals.—The most significant project in the field of nonferrous metals is the Asahan aluminum smelter. This project, initiated in the 1960's as a Soviet-aid project and subsequently suspended, will draw as a source of hydroelectric power on the Asahan River, which drains the mammoth Lake Toba, in North Sumatra. P.T. Indonesia Asahan Aluminum, a joint-venture company, will implement the

project. Costs are projected at about \$465 million for the smelter, \$260 million for the power system, and \$37 million for infrastructure. The Indonesian Government holds 10% of the company and Nippon Asahan Aluminum (NAA) holds 90%. NAA consists of five groups involving 12 Japanese firms. Sumitomo Chemical, which has been interested in the project since the mid-1960's, realized that it would not be able to finance the project itself, and other Japanese industrial and trading firms were invited to participate. Seventy percent of financing will be provided by Japanese Government agencies, the Export-Import Bank of Japan, and the Japanese Overseas Economic Cooperation Fund and 20% will come from Japanese commercial banks.

The 12 Japanese partners and the State-owned general mining corporation, P.T. Aneka Tambang representing the Indonesian Government, formed the joint venture, P.T. Indonesia Asahan Aluminum (INALUM), in January 1976. Its authorized capital is \$25 million, of which \$3.5 million is paid in. Authorized capital is to increase to \$261 million within 4 years. The Indonesian Government has formed a regulatory body to be called the Asahan Authority to supervise the execution of the basic agreement from the Indonesian standpoint.

The project agreement calls for constructing two power plants, one generating 280 MW at Segura-gora and the other 320 MW at Tangga. All but 40-50 kW will be used for the smelters to be located at Kuala Tanjung on the coast. The smelter will ultimately consist of three 75,000-metric-ton annual capacity potlines. The smelter is scheduled to be producing 75,000 metric tons of aluminum annually by the end of the seventh year (mid-1982) with another 75,000 metric tons by the end of the eighth year, and a final 75,000 metric tons by mid-1984, making a total of 225,000 metric tons annual production. In mid-1976 the Japanese firm Nipponkoei was conducting site surveys for the power plants. Yachio Consultants (Japan) was planning the smelter facilities. While no decisions had been made on equipment, it was expected that a prebaked arc furnace process would be used. It is still not determined whether the smelter will ultimately use bauxite from Indonesia or from other countries, although initially the source will probably be Australia.

The project depends not on mineral resources but on the power potential of the Asahan River. Indonesian spokesmen have acknowledged that the profitability of the project may be marginal. In their view, its primary justification is from its potential for creating a regional pole of development and stimulating the exploitation of Indonesian bauxite reserves as well as investment in aluminum fabrication, ancillary, and service industries.

The Asahan project will require about 500,000

metric tons of alumina annually. Two alumina plant sites have been considered in Indonesia (see Mining), one in Kalimantan and one on Bintang Island. Aluminum Company of America (U.S.) was developing deposits in West Kalimantan; however, the project was suspended. The Indonesians were negotiating in 1976 with the U.S.S.R. for financing to build a plant at Bintang. The Bintang alumina project was the subject of a \$500,000 feasibility study on behalf of the Indonesian Government by Kaiser Engineers (U.S.) in 1975. The Indonesian low-grade bauxite, although high in silica content, costs only about \$5 per metric ton, while the higher grade ores on the international market sell for \$24 per metric ton. Thus, while it requires increased amounts of caustic soda, the ore can still be processed economically, and according to Kaiser, the project is feasible.

P.T. International Nickel is building a \$840 million nickel refining facility in Soroako, South Sulawesi. The process includes drying and reduction of laterite ore so that it is brought from 2.5% nickel content to 8% to 10% nickel in the first stages, and then later to 75% nickel-matte which will be exported. There is no plan to produce nickel metal. Production was slated to begin in the fall of 1976, with a capacity of 17.5 million metric tons of contained nickel, with an increase to 52.5 million metric tons following completion of the second phase in 1978. Another project, Pacific Nickel Indonesia, a joint venture including U.S. Steel, Newmount Mining of the United States, and European firms, plans construction of a plant to produce metallic nickel and concentrates annually on Gag Island near Irian Jaya. Using the Sheritt-Gordon hydrometallurgical process the facility will produce 55,000 tons of high-grade nickel in the form of briquettes or powder, and about 1,000 tons of nickel and 500 tons of cobalt in the form of a mixed sulfide concentrate. As of mid-1976 financing was still being sought.

Metal Products Fabrication

Significant activities in the Indonesian metal products fabrication industry include backward integration of several automobile assembly and appliance production plants for greater use of local components, expansion of foundry facilities, and increasing the shipbuilding capacity. Government plans call for 40% of all automobile components to be made in Indonesia by 1980, 70% by 1985 and 100% by 1990. A number of investment applications have been approved for production of automobile parts and such component production is expected to increase considerably. Local producers of air-conditioners, refrigerators, and other household appliances are also expanding their use of locally produced parts.

In 1976, P.T. Barata started construction of a \$16-million steel foundry to be located at Gresik, East Java. The project is being constructed with a West German Government credit in addition to Indonesian funds, which will be used in part for rehabilitation of existing machinery. The foundry will employ 300 workers and produce 5,000 metric tons of cast products per year for the engineering, chemical, mining, and transportation industries. Planned to begin operation in late 1977, the foundry is being built with the assistance of German, Japanese, and Australian engineers. Output will be various alloy steels such as cast steel, carbon steel, manganese steel, molybdenum steel, nickel steel for use in manufacturing of equipment for sugar mills, rubber mills, and chemical plants. With Japanese financing, Barata is also planning to build a foundry in Medan, Sumatra with production capacity of 3,000 metric tons of cast iron and 1,200 tons of cast steel per year.

Investments in shipbuilding are increasing rapidly. P.T. Raksaguna in West Java plans an investment of \$45 million to expand shipbuilding capacity by 45,000 DWT annually, and employ 2,000 workers. P.T. Galangan Kapal Indonesia (Nusa Segara Sakti) plans an investment of \$29 million for annual production of 60,000 DWT of new vessels and employing 3,000 workers. P.T. Marine Bounty, of Medan, plans a \$2-million investment for an annual production capacity of 4,500 DWT with 153 new employees.

The Indonesian metal products industry faces a number of severe problems including limited purchasing power in a number of market segments, sharp competition between some domestic and imported products, and high import duties and prices for domestic raw materials.

The shortage of trained Indonesian machinists has resulted in underutilization of the estimated 10,000 machine tools installed in Indonesia. It is estimated that machinery is used at only 30% of capacity. Improperly installed and poorly maintained machine tools, combined with often inferior castings caused by absence of quality control, result in poor quality, high-priced local metal products which are unable to compete with equally high-priced imports.

Despite these problems, there has been substantial new investment, both foreign and domestic, in the metallurgical and metalworking industries. During 1975 and the first quarter of 1976, applications for foreign investment in these industries totaled slightly over \$1 billion in authorized capitalization, while applications for domestic investment totaled \$164.8 million. The largest portion of the foreign investment consisted of the \$870 million Asahan aluminum project.

GROWTH PROSPECTS

Government planners projected annual growth rates of 24% for the metal production industry and 30% for the equipment manufacturing industry (including metal products and other manufacturing and assembly) during 1975-79. However, by early 1976, production figures indicated growth in some sectors of these industries may be in excess of these rates. For example, production of motor vehicles was projected by the national development plan at 42,000 units in 1975, while actual production was 78,873 units in that year. The national plan projects production of four-wheel motor vehicles to reach 70,000 by 1978-79.

Manufacture of iron and steel products has been considerably higher than planned. Total production was expected to reach 300,000 metric tons in 1975 and 510,000 metric tons in 1976, but by 1975, actual output approached 490,000 metric tons, nearly 200,000 metric tons in excess of the target for that year. Growth of the iron and steel industry will be stimulated when production from the Krakatau Steel complex begins to come on stream in early 1978. There also should be a substantial decrease in Indonesia's dependence on imports of scrap and basic steel products for the manufacture of bars, rods, plates, sheets, pipe, and tubing (see table 5).

Table 5.—Indonesia: Metals Imports and Production
(in thousands of metric tons)

	1975		1980	
	Imports	Production	Imports	Production
Iron & Steel Scrap	15	—	10	—
Pig Iron	2	—	5	—
Billets	36	—	—	500
Casts	28	—	10	20
Wire Rod	65	30	5	100
Bars	88	115	100	256
Channels, Angles, & Sections	85	—	20	150
Plates & Sheets	250	250	100	650
Hoop & Strip	18	—	10	50
Sponge Iron	—	—	—	500
Unwrought Aluminum ..	12	—	5	—
Tin Metal	—	18	—	20

Source: Estimates based on industry sources.

The Asahan aluminum smelter and the two nickel projects are primarily aimed at export sales, although the former will provide opportunities for further development of aluminum products fabrication. With the exception of International Nickel, which should be in full production in 1978, these projects will have little impact on export earnings until after 1980.

However, Indonesia will have difficulty in increasing production of its metalworking and equipment manufacturing industries which require technical expertise and trained machinists. There is a critical shortage of adequately trained personnel to operate

machine tools and other equipment for producing precision parts used in diesel engines and other complex products. Such products have been only assembled in Indonesia using imported parts; fabrication of precision steel parts will be a more difficult step. While the Government, recognizing this need for trained manpower, plans to establish four training centers that will train 1,500 metalworking specialists per year, the centers are not expected to be in operation until 1979. Between 1970 and 1975, only about 400 machinists were trained in government programs. It is important to remember, however, that foreign firms such as Bechtel and Fluor, which are building petrochemical, fertilizer, and LNG plants, have trained thousands of workers in specialized metalworking skills, particularly in welding and fabrication of large metal parts, but to a much lesser degree in machine tool operation.

MARKET SIZE

There is no domestic manufacturing of metals industries equipment in Indonesia, and all metallurgical and metalworking equipment is imported. In 1975 the market for metallurgical and primary metals production equipment was an estimated \$18.2 million, nearly triple the 1973 figure (see table 6). By 1980 it is expected to reach nearly \$47 million as a result of expenditures for the Krakatau Steel and Asahan Aluminum projects. These projects should also result in increased sales of instrumentation and controls.

Japanese suppliers have the leading position in supply of metallurgical and primary metals production equipment, with about 60% of the market by value in 1975, followed by West German and U.S. suppliers with 15% and 10% market shares respectively. The planned investments indicate that Japanese and West German suppliers are likely to increase their market shares by 1980.

Leading suppliers of machine tools and metal products fabrication equipment to the Indonesian market are Japanese, West German, Taiwanese, and from the People's Republic of China. In 1975, Japanese suppliers had a 39% share of the \$20-million machine tool market, followed by West German suppliers with a 17% share, Taiwanese suppliers with a 13% share, and those from the People's Republic of China with a 18% share. While the market is expected to reach \$47 million during 1980, little change in market shares is expected.

Sales of welding equipment were \$7.3 million in 1975 and should more than double by 1980. Japanese and U.S. suppliers lead in the field of welding equipment. In 1975 Japanese suppliers contributed 42% to Indonesian imports as compared to 40%

Table 6.—Indonesia: Size of Import Market for Metallurgical and Metalworking Equipment
(in thousands of US\$)

	1973	1974	1975	1976	1980
METALLURGICAL AND PRIMARY METALS PRODUCTION EQUIPMENT					
United States	1,050	1,800	1,820	2,300	4,600
Japan	2,500	8,500	10,900	—	—
West Germany	750	1,400	2,730	—	—
Belgium/Luxemborg	220	475	540	—	—
United Kingdom	140	630	700	—	—
Netherlands	175	160	910	—	—
Others	64	1,035	600	—	—
TOTAL	4,900	14,000	18,200	22,810	46,700
MACHINE TOOLS AND EQUIPMENT FOR METAL PRODUCTS PRODUCTION					
United States	900	1,240	1,600	1,900	3,700
Japan	2,500	8,100	7,900	—	—
West Germany	1,800	3,000	3,600	—	—
Taiwan	1,300	2,500	2,800	—	—
China	850	1,600	1,800	—	—
United Kingdom	800	1,400	1,600	—	—
Others	450	800	1,000	—	—
TOTAL	8,600	18,640	20,300	24,600	46,800
WELDING EQUIPMENT					
United States	1,820	2,300	2,900	3,700	6,400
Japan	1,550	2,600	3,100	—	—
West Germany	400	560	700	—	—
Netherlands	60	170	180	—	—
France	50	100	120	—	—
United Kingdom	30	10	50	—	—
Others	190	160	250	—	—
TOTAL	4,100	5,900	7,300	9,090	15,640
CONTROL AND MEASURING INSTRUMENTS FOR METALLURGY, METALWORKING AND MACHINING					
United States	20	30	80	80	160
Japan	180	260	280	—	—
West Germany	80	70	120	—	—
Switzerland	70	30	50	—	—
France	—	30	30	—	—
United Kingdom	—	30	10	—	—
Others	10	20	10	—	—
TOTAL	360	470	580	800	1,800

Source: Official Indonesian and supplier statistics, and estimates based on trade source interviews.

from the United States. These market shares are generally expected to remain stable through 1980.

MARKET OPPORTUNITIES

In view of the construction and expansion plans of the Krakatau and Asahan projects, as well as the addition to other primary metals production plants such as iron foundries, continuing good sales opportunities are foreseen for such items as ingot molds, molding machines, die casting machines, rolling equipment for both hot and cold rolling mills, and complete rolling mill plants.

Demand for die and mold production facilities in Indonesia should increase, particularly for use in small mills utilizing scrap iron and steel. Small steel mills using electric arc furnaces should also have good sales potential.

Opportunities exist for consultant and engineering services to assist in the large steel and nonferrous metals projects planned. A number of consulting firms are already active in this field. For example, as previously mentioned, Kaiser and Armco are acting as consultants to P.T. Krakatau Steel and Kaiser also performed a feasibility study on development of the Bintang Island Alumina Project. In planning its Surabaya foundry center, P.T. Barata engaged consultants Klingenstein and Ferro Consulting GmbH of West Germany.

For the majority of job and in-plant machine shops, greatest demand is for simple-to-operate general purpose machine tools including: lathes, shaping machines, drilling machines, milling machines, band-saws, punching machines, boring machines, grinders, and hydraulic or mechanical presses. Industry sources indicate that the most commonly used items include 1-m to 3-m lathes, 35-mm to 60-mm shaping machines, drilling machines of up to 1/2 inch, and presses of 10- to 100-tons capacity.

There is a small but growing market for precision lathes and cutters. A number of machine shop owners indicated such equipment would be required to augment less precise machines now being used. Good sales potential exist for engine lathes for use in training schools since vocational education is growing.

Machine tools for the automobile industry also have good sales potential. With the Government requiring automobile assemblers to make larger amounts of automobile parts, requirements are growing for such machines as crankshaft grinding machines, radial drilling machines, slotting machines, threading machines, cylinder boring machines, face lathes, bandsaws, and circular saws.

Indonesian ship repair and building firms will require large arc welders, straightening rollers, bending rollers, shearing machines, drilling and punching machines, hydraulic and crank presses, pneumatic mechanical hammers, drilling machines, sawing machines, pipe bending machines, grinding machines, lathes, thread cutting machines, milling machines, facing machines, turret lathes, slotting machines, and large-scale foundry equipment.

For the several Pertamina petroleum and natural gas projects, a substantial amount of pipe welding equipment is required. At the Arun (Sumatra) liquid natural gas (LNG) project site, \$900,000 worth of welding equipment was recently imported from the United States including Ransome welding positioning equipment and Hobart welders. In addition, an on-site acetylene production plant has been built.

The Indonesian market for power handtools is increasing with the growth of various appliance and vehicle assembly operations, as well as for use in general machine shops. According to industry sources, the total annual market for power handtools is over 5,000 units of power drills, 5,000 power grinders, and 10,000 units of other types of power handtools.

For air-conditioner, refrigerator, and other appliance fabrication and assembling operations, the following equipment items will be needed: shears, press brakes of up to 200 tons, portable welder guns of up to 200 kVA, die sets, cutoff saws, deburring machines, tube sizing machines, swaging machines, serpentine benders, and magnetic tools.

IMPORT PROCUREMENT

Buyers Universe

The buyers universe in the primary metals production industries includes: 5-10 large State-owned enterprises such as P.T. Krakatau Steel, and P.N. Timah; as well as large foreign-owned firms such as International Nickel and Pacific Nikkel.

It is estimated that several thousand firms throughout Indonesia are engaged in metalworking and metal products fabrication. These include 10-15 large State-owned enterprises such as P.T. Barata, PNKA (the State Railroad Public Corporation), P.N. Dok Surabaya, and others. The majority are small machine shops with one or two lathes, drills, and perhaps some welding equipment. In addition, hundreds of in-house machine shops located in factories, such as textile and canning plants, require machine tools for various machinery repairs. Of all firms engaged in metalworking and metal production, about 600 have between 15 and 25 employees, while about 80 have over 150 employees.

Most metal production and fabrication is concentrated in the major cities of Java, such as Jakarta, Surabaya, or Semarang, and in the major cities of Sumatra, such as Medan and Palembang. In addition there are metalworking activities associated with the large "enclave" petroleum and mining projects such as the Caltex oil field complex at Pekanbaru in Sumatra or the LNG construction projects in Aceh, Sumatra, and East Kalimantan.

In large State-owned enterprises, procurement is normally by means of open tender where the enterprise issues invitations to bid, evaluates the bidders and awards a contract. Until recently government firms such as P.T. Barata had to obtain approval for all purchases from the Ministry of Industry, but with emphasis on efficiency and profitability among government firms, more decisionmaking authority is being shifted to the firms.

For large foreign-owned firms the purchasing decisions are often made in the home offices. Medium-size and small Indonesian firms normally purchase through local sales representatives or distributors.

Foreign Suppliers Universe

Japanese firms have a very strong market position in the supply of basic metal production and foundry equipment, as a result of their many joint ventures in Indonesian's iron and steel industry. Trading firms such as Mitsui, Marubeni, and Mitsubishi normally supply complete plants for steel pipe, bar, sheet, and similar production. German suppliers such as Thyssen Rheinstahl, Otto Wolf, and Ferrostahl also have strong market positions in the supply of basic steel and foundry equipment, but Japanese suppliers are often more competitive. For example, Toyo Menka Kaisha Ltd., a Japanese firm, was able to win in bidding against strong German competition for the P.T. Barata foundry project at Gresik. This fact is particularly surprising, as financing for the project came from Germany.

Swindell-Dressler a U.S. firm, is supplying the basic reduction equipment for the Krakatau Steel project. This represents a significant new market entry for U.S. suppliers.

Japanese suppliers such as Toyota and Makita have strong market positions for sales of higher quality precision machine tools. They are often able to offer better price and credit terms than European and American competitors. Some sales representatives state that Japanese machine tools are sometimes offered at half U.S. prices. More important, however, is the large Japanese investment in the Indonesian metalworking industry and the preference of Japanese investors for their own equipment.

Suppliers from Taiwan, the People's Republic of China, and East European countries (particularly Bulgaria) are strong in the market for basic machine tools. Taiwan suppliers have obtained a strong market position as a result of their low prices and quick delivery (as little as 2 to 3 weeks from placing of order). Machine tools supplied from the People's Republic of China have gained in popularity as a result of low prices and very liberal credit terms. This is also true of East European- and U.S.S.R.-produced machine tools. Prices of some East European machine tools are sometimes as low as one-fifth of those offered by U.S. suppliers. Referring to liberal credit terms, one sales representative said that Bulgaria offered terms of 1 to 2 years. Suppliers from North Korea have also entered the market with 1-year interest-free credit terms.

MARKETING FACTORS

The major channel of distribution for primary metal production equipment is through project contracts, and equipment is normally purchased by the prime contractor in conjunction with the buyer. In the case of P.T. Krakatau Steel's projects, for example, purchasing will be carried out by the firm in direct consultation with the contractors in charge of plant construction.

Import sales of machine tools and metalworking equipment are normally through sales representatives based in Jakarta. These representatives have either exclusive or nonexclusive franchises from overseas machine tool suppliers.

The larger sales representatives have offices in the major cities of Indonesia. For example, P.T. Setia Saptia, one of the major machine tool sales representatives, has branch offices in Bandung, Semarang, Surabaya, and Medan, in addition to its main office in Jakarta. The firm also has sales agents in other smaller cities. P.T. Ditosa, sales representative for Black and Decker tools, has branch offices in Bandung, Balikpapan, Surabaya, and Semarang. Sales representatives agree that spare parts availability is essential in development of the market for metalworking equipment.

Credit is also an essential element in Indonesian metalworking equipment marketing. Sales representatives give credit to machine tool buyers in terms ranging from 3 months to 1 year. They therefore expect suppliers to offer 3 to 6 months' credit from date of equipment arrival in Indonesia. Some representatives use banking facilities in Singapore and make payments from there. As previously mentioned, some East European suppliers offer terms of up to 2 years, but this is considered exceptional.

The shortage of trained machinists is the most severe problem facing suppliers attempting to develop sales in the machine tool market. Industry sources repeatedly emphasize the need for more trained machinists. One sales representative said: "Our customers are afraid to assign their workers to expensive precision machines because they feel the machine will be ruined. They therefore buy cheap machines."

Industry sources stressed the fact that machines sold in Indonesia should be calibrated in the metric system. The Indonesian electricity supply is 125/220 volt, 50 cycle.

Trade promotion of machine tools is usually directed specifically at the major end users. For example, one large sales representative in Jakarta has a small showroom where he invites potential customers to exhibits of new equipment every 4 months.

Indonesian trade associations in the metals industries are excellent channels through which American

firms may reach potential customers. Promotional mailings made to association members as well as the organization of equipment exhibitions for them would provide effective means for market entry and sales development. Machine tool imports are subject to an import duty of 10% and a sales tax of 10%.

Metals Industries Associations

Badan Kerja Sama (B.K.S.) Asosiasi Industri Logam dan Mesin (Joint Committee of Metals and Machinery Industry Associations)

Jalan Salemba Raya 30, lantai III
Jakarta

Asosiasi Pabrik Kabel Listrik Indonesia (APKABEL)
(Electrical Cable Manufacturers Association)

Jalan Gajah Mada No. 184 (atas)
Jakarta Barat

Gabungan Agen Tunggal dan Assembler Kendaraan Bermotor (Association of Motor Vehicle Sole Agents and Assemblers)

Indonesia (GAAKINDO)
Jalan Salemba Raya No. 30 lantai III
Jakarta-Pusat

Gabungan Industri Alat-alat Mobil Indonesia (GIAM) (Association of Automobile Parts Manufacturers)

Jalan Salemba Rama No. 30 lantai III
Jakarta-Pusat

Gabungan Pabrik Besi Baja Seluruh Indonesia (GAPBESI) (Association of Iron and Steel Manufacturers)

d/a P.T. Krakatau Steel, Jl. Gatot Subroto
Jakarta (Includes separate sections for reinforcing bars, pipe, cable, screws, and light gauge steel).

Gabungan Pengusaha Industri Electronics dan Alat-alat Listrik Rumah Tangga, (Gabungan Electronica) (Association of Electronics and Electrical Goods Manufacturers)

Jalan Hayam Wuruk 27 (lantai IV)
Jakarta

Gabungan Industri Pengerjaan-Logam dan Mesin Indonesia (Indonesian Metalworking and Machine Industries Association)

Jalan Kpt. P. Tendean, Keb. Timur
Jakarta

Gabungan Pabrik Seng Indonesia (GAPSI) (Indonesian Galvanized Iron Sheet Manufacturers Association)

Jalan Ir. H. Juanda No. 3
Jakarta

Indonesian Aluminum Extruders Association (IAEA)
PPM Building, Jl. Menteng Raya 9
Jakarta

Ikatan Perusahaan Industri Kapal Nasional Indo-

nesia (IPERINDO) (The Indonesian National Ship Building Industry Association)

Jalan Hayam Wuruk 4N. (lantai II)
Jakarta

Indonesia National Aircraft Service & Industry Association (INASIA)

Hotel Kartika Chandra, lantai IV
Jalan Gato Subroto
Jakarta

Perhimpunan Agen Tunggal Alat-alat Besar Indonesia (PAABI) (The Indonesian Heavy Equipment Sole Agents Association)

Jalan Salemba Raya No. 30 (lantai III)
Jakarta

Perhimpunan Agen Tunggal & Assembler Sepeda Motor Indonesia (Indonesian Motorcycle Sole Agent and Assembler Association) (PAASMI)

Jalan Salemba Raya No. 30 (lantai III)
Jakarta

COMPETITIVE POSITION OF U.S. SUPPLIERS

Most major U.S. suppliers of metalworking equipment are not well represented in the Indonesian market. Only a few types of U.S. metalworking equipment are well known. For example, Black and Decker has a leading position in the market for power handtools. DoAll contour cutters are used in a number of shops, but many of the machines come from DoAll licensees or subsidiaries outside the United States.

To inform end users and sales representatives about U.S. equipment availability in the machine tool and metalworking field, a marketing effort is warranted. A U.S. machine tool catalogue exhibit accompanied by a technical seminar held in Jakarta in 1972 stimulated considerable interest in the market.

Some industry sources contend that there is little opportunity for U.S. suppliers in sales of basic machine tools, and that it would be best to concentrate on the market for high-production, specialized machine tools which in some cases are made only in the United States. However, attention to operator training will be essential before considerably more specialized equipment is introduced to the market. The establishment of training schools equipped with U.S. equipment would be very effective in promoting U.S. equipment sales.

U.S. suppliers should also find good sales potential among American-owned firms who are establishing plants in Indonesia. For example, as the Indonesian electronic industry expands, requirements will exist for precision mold and die production facilities to serve the industry.

Mining, Petroleum, and Natural Gas

Indonesia's mineral and petroleum resources have brought new opportunities for national development and advantageous international relationships. The country's mineral and petroleum wealth has attracted investment and catalyzed growth in related industries. Mineral and petroleum exports have become the country's principal foreign exchange earner, displacing traditional agricultural products. In 1975 crude oil production was 477 million barrels, while foreign exchange earnings from oil exports totaled \$5.3 billion, about three-fourths of the total; during the same year gross export earnings from minerals totaled \$250 million, with tin being the largest contributor.

Government policy is that mineral and petroleum resources are national property, and laws have been enacted which guarantee the Government a strong voice in the management of petroleum and mining operations and a significant share of profits. All petroleum exploration, development, and production are carried out either directly by or under contract to the national petroleum corporation, Pertamina. A similar approach through State-owned tin, coal, and general mining enterprises prevails in the mining industry.

Capital expenditures for petroleum and natural gas exploration and development were approximately \$1 billion in 1975, of which equipment investments represented a significant portion. Excellent opportunities will continue to exist for sales of drilling rigs, pumps, compressors, bits and expendables, survey and testing equipment, aerial photographic equipment, and seismometers, as well as of specialized services for the petroleum industry. Sales of mining equipment in 1975 amounted to an estimated \$26 million, and major mining projects coming on stream are expected to sustain a growing market.

U.S. manufacturers of equipment for the petroleum industry have a leading position in the Indonesian market, and both American mining equipment and technology are highly regarded. U.S. firms providing specialized consulting, support and technical services in both the petroleum and mining industries also are well established in Indonesia. Creative marketing strategies will be necessary for

U.S. suppliers to maintain their leading position in what is becoming an increasingly competitive market.

MINING INDUSTRY STRUCTURE AND SIZE

Indonesia's mining industry is well established although the full magnitude of mineral resources has not been determined. Only minimal geological exploration has been accomplished, but surveys indicate that the country is endowed with substantial deposits of the following ferrous and nonferrous metals: bauxite, coal, copper, iron, manganese, nickel, and tin (see table 1).

Total production of these seven major minerals in 1975 increased about 29% over the 1970 output of 2,031,000 metric tons. In 1975 gross earnings from the export of these minerals reached \$250.9 million. Tin was the highest income producer with 61% of the total, or \$154.1 million, followed by copper with 27%, or \$67.8 million (see table 1).

Table 1.—Indonesia: Gross Earnings from the Export of Six Major Minerals
(millions of U.S. dollars)

	1970	1973	1974	1975	1976	1980
Bauxite	5.1	6.5	6.9	5.9	6.0	9.0
Copper Concentrates	—	75.2	125.3	67.8	50.0	75.0
Iron Sands	1.0	1.3	1.8	1.9	2.0	1.9
Manganese	0.3	0.3	0.7	0.9	0.9	1.1
Nickel Ore	5.9	9.8	13.8	20.9	29.6	34.0
Tin	53.6	88.8	172.8	154.2	160.0	185.0
TOTAL	65.9	181.9	321.3	250.9	247.8	325.1

Source: Directorate-General for Mining estimates based on trade sources.

The mining industry has made an increasingly important contribution to gross domestic product. Its share rose steadily from 3.7% in 1960 to 9.6% in 1973 and is expected to reach 10.8% by the end of the current national development plan in 1979.

Three State mining companies and twelve foreign mining firms with mineral extraction contracts account for the majority of mining in Indonesia. The State companies are: P.N. Tambang Batubara, P.T. Aneka Tambang, and P.N. Tambang Timah. In addi-

tion, mining permits have been issued to many small domestic mining companies. A number of engineering and other firms offering specialized technical services play an important role in the mining industry, generally working as contractors to the State and foreign mining corporations (appendix 1).

The State Mining Companies

P.N. Tambang Batubara is responsible for all coal exploration and exploitation and for the development of present and prospective coal mining regions. Its address is Jalan Prof. Soepomo S.H. 10, Jakarta.

P.T. Aneka Tambang (located at Jalan Bungur Besar 24-26, Jakarta) is responsible for all mining production with the exception of coal and tin. The company works with foreign mining contractors, supervises Indonesian mining permit holders, and engages in direct mining operations. During the early 1970's P.T. Aneka Tambang suffered from tight world export markets, marginal mining operations, and inexperienced management. A drop in profits during 1975 caused the company to close several marginal mines, improve marketing methods, and upgrade the administrative organization. Mining projects already scheduled are expected to proceed, but Aneka Tambang's exploration program may be scaled down considerably. Aneka Tambang's executives serve on the boards of directors of foreign joint-venture mining firms in which the Indonesian Government is a partner.

P.N. Tambang Timah, the principal producer of tin, in 1975 accounted for 91% of the nation's total tin export earnings. Recent rehabilitation and expansion of smelting facilities increased annual capacity to 25,000 metric tons which is considered sufficient for present and projected needs (see Metallurgical and Metalworking Industries). Tambang Timah, located at Jalan Jendral Gatat Subrato) has offices in Singapore (SINDOTIN), London (EOMIN), and New York (INDOMETAL). Offshore mines account for 60% of Tambang Timah's tin output. A recent exploration program, assisted by the Government of the Netherlands, uncovered potentially rich fields off Bangka, Belitung, Kerimun, and Kundur Islands. The 50 square kilometer area is reported to have mineral deposits in thicknesses averaging 20 meters. Since future exploration efforts are expected to focus offshore, Tambang Timah has ordered a Payne (U.K.) seagoing dredge capable of operating at depths up to 50 meters; delivery is scheduled for 1979.

Tambang Timah's plans include increasing exploration efforts, modernizing the dredging fleet, continuing research in mineral processing, and improving technical training programs. The company is also planning diversification including exploration for

kaolin and surveys of export possibilities. Also under consideration are (1) a joint venture with CSR (Australia) to produce mineral wool from tin slag, and (2) exploration for clay deposits. The projects' outputs will be used to supply the domestic building materials industry. Tambang Timah is undergoing reorganization from State-owned (P.N. to limited liability (P.T.) status.

BATAN (Badan Tenaga Atom Nasional, the national atomic energy authority), is responsible for the exploration and exploitation of uranium: Intergovernmental agreements form the basis for foreign participation in uranium production.

The French Commission de l'Energie Atomique has provided exploration assistance in Kalimantan under the terms of a 1969 agreement. Test drilling which began in 1975 yielded promising results. Deeper drillings are now underway.

Discussions have been held with the Federal Republic of Germany for providing assistance to BATAN. Initial surveys in Central Sumatra, although not complete, have been promising, while in Lampung Province drilling was scheduled to begin in late 1976. No announcements are expected concerning either project until 1978 at the earliest, but a report of the 1974 Indonesian National Energy Conference predicted that nuclear energy could supply 37% of domestic energy needs by 1999.

Indonesia has signed, but not ratified, the Nuclear Non-Proliferation Treaty. Until the treaty is ratified, Indonesia is ineligible for technical or financial assistance from the U.S. Energy Research and Development Administration (ERDA).

The limited world supplies of uranium will provide continuing foreign interest in the exploration and exploitation of Indonesian uranium resources.

Contracts of Work.—Mining activity is regulated by a system of mining concessions which grants a company exclusive mining rights in a specified area with the provision that certain conditions are fulfilled.

The terms include specified periods for exploration, followed by feasibility studies, another specified period for construction, and a maximum of 30 years for operation. The investor must obtain a separate permit for each stage of activity. After the exploration period the foreign investor must provide the Department of Mining with a summary of its geological and metallurgical investigations including samples, drawing, and other data. A firm may request a confidential classification for specific findings. After 30 years of production, all land, construction, and equipment become the property of the Government.

Procedures in applying for a mining concession are

1. Study detailed geological maps and previous survey materials which are available from the Department of Mining. Listings of present contract areas are also available.

2. Conduct geographic reconnaissance. An application for a Reconnaissance Permit must be filed with the Department of Mining with a copy given to the Capital Investment Bureau within the Mining Department. These permits do not guarantee priority rights.

3. Analyze mineral samples. The Government will assist in analysis through the Directorate of Geology and the Institute for Mineral Processing in Bandung.

4. File an application for a mining concession. Applications for mining concessions must receive the approval of the Capital Investment Bureau within the Mining Department before being forwarded to Badan Koordinasi Penanaman Modal (BKPM), the Capital Investment Coordinating Board. Firms must provide evidence of their financial stability and technical capability.

A concession is 4,000 square kilometers, but a company can hold more than one concession area. The application cost is \$100 per concession. Land rent is \$100,000 annually per concession and a performance bond of \$100,000 must be deposited with the Government. The bond is refunded when a report is filed indicating that investments have exceeded \$100,000. Quarterly progress reports and annual planning reports must be submitted to the Government. An investor can relinquish any portion of its concession area if initial investigation does not justify further expenditures.

Contracts of Work contain requirements concerning the sharing of resources with the Government, employment of Indonesians, equipment purchases, relations with Indonesian firms, and compensation to persons displaced by mining activity. Details of current regulations can be obtained from the Department of Mining and the U.S. Embassy, Jakarta.

Domestic firms can obtain "kuasa pertambangan," (K.P., "authority to mine" permits), at minimal cost for 100 hectares. Mining permit areas are often within the concession boundaries of foreign mining companies, and a domestic firm sometimes obtains exploration and technical assistance from the foreign mining company.

Mineral Production

Bauxite and Alumina.—Bauxite production in 1975 was 992,000 metric tons which represented a 23% drop from the 1974 figure of 1,299,400 metric tons. Gross export earnings fell 14% from \$6.9 mil-

lion in 1974 to \$5.9 million in 1975. These decreases were the result of a 17% cutback in a major Japanese export agreement. This 10-year contract was signed in 1974 and specified annual purchases of 1.2 million tons, but they were reduced to 1 million metric tons in 1975. Production and earnings are projected to increase slightly in 1976. Bauxite extraction is primarily from deposits on Bintan Island where reserves are estimated at 25 million tons.

P.T. Indonesia Asahan Aluminum (INALUM), a joint venture between the Indonesian Government and a Japanese consortium, was formed in January 1976 to build an aluminum-hydroelectric dam project at Asahan, North Sumatra (see Metallurgical and Metalworking Industries). The original project agreement, signed in July 1975, included a \$465 million aluminum smelter with an annual capacity of 225,000 metric tons. Production is scheduled for 1984.

In May 1976 the Indonesian Government announced plans to construct an alumina plant on Bintan Island. The project, to be built with a Soviet loan, will be able to supply the Asahan aluminum smelter with 450,000 metric tons of alumina annually.

P.T. Alcoa Minerals of Indonesia (ALCOMIN), a joint venture of Aluminum Company of America (ALCOA) had planned to build a 1.6 million metric ton mining and refining project in West Kalimantan. However, Alcomin announced in 1976 that, due to adverse conditions in the world aluminum market, it would be unable to complete the project in the time stipulated in its present contract.

Bauxite extraction is no longer open to foreign investment.

Coal.—Workable coal deposits are estimated to be well over 2.6 billion metric tons (see table 2). Production in 1975 amounted to 206,300 metric tons, a 32% increase over the 1974 figure. All production was for domestic consumption (see table 3).

Recent increases in world market prices for oil have resulted in expanded exploration and rehabilitation programs in the coal industry in order to increase foreign exchange earnings by replacing domestic oil consumption with coal. Government plans call for an annual production rate of 2 million metric tons of coal by 1985. Expansion efforts are concentrated in the two existing mine areas, Bukit Asam and Ombilin, Sumatra, which are operated by P.N. Tambang Batubara. Exploration efforts are also focused in Sumatra by Riotinto Bethlehem Indonesia (RBI) and Shell Minjouw, N.V. both domestic-foreign joint ventures which are considering possibilities for export.

The Bukit Asam area, near Palembang, Sumatra, is 3,000 hectares and is primarily surface mined. Production in 1975 was 130,293 metric tons, a 68%

Table 2.—Indonesia: Coal Deposits in Indonesia

Area	Deposit (million metric tons)	Geological Age	Type of Coal
Central Sumatra, (Ombilin)			
Sungai Durian Field ¹	93	Miocene	Hi vol bit
Sigalut	80	Miocene	Hi vol bit
Parangahan	20	Miocene	Hi vol bit
Tanah Hitam ¹	12	Miocene	Hi vol bit
Suger	2	Miocene	Hi vol bit
Painan	6	Lower tertiary	Anthracite
Sungai Sapuk-Sungai Keruk	7	Miocene	Hi vol bit
Logas Tanko, Rokan and Balu ²	60	Lower tertiary	Hi vol bit
Sub Total	280		
South Sumatra			
Bukit Asam	15	Pliocene	Anthracite
	82	Pliocene	Low vol bit
	67	Pliocene	Hi vol bit
	1,872	Pliocene	Lignite
Sukamarinda	19	Pliocene	Lignite
Buuram, Kendin-Ringen	32	Pliocene	Low vol bit
	39	Pliocene	Hi vol bit
	38	Pliocene	Lignite
Sub Total	2,164		
Kalimantan			
Parapatan, E. Kalimantan	40	Pliocene	Hi vol bit
Mahakam, E. Kalimantan	50	Upper tertiary	Hi vol bit
Oung Batu Besar, S. Kalimantan	7	Upper tertiary	Hi vol bit
Pulau Laut, S. Kalimantan	21	Lower tertiary	Hi vol bit
Sub Total	118		
Java			
Cimandiri, W. Java ...	6	Eocene	Lignite
Bajah, J. Hava	7	Eocene	Lignite
Bojongmanik	7	Eocene	Lignite
Sub Total	20		
TOTAL			
ESTIMATED			
DEPOSITS	2,582		

¹ In operation, 1976.

² Closed in 1971.

Source: Directorate-General for Mining.

Table 3.—Indonesia: Domestic Use and Exports of Coal, 1953-75

Consumption	1953	1960	1969	1974	1975
Domestic Consumption:					
The Padang Cement Factory	29,900	32,200	50,200	39,900	40,000
The State Railway Authority	365,800	401,200	66,900	33,800	39,000
Gas/electricity	13,500	10,500	1,000	—	—
Bangka Tin	69,500	72,300	18,100	12,900	24,000
PELTIM (Tin Smelter) ..	—	—	—	6,000	6,500
Private companies	37,600	41,800	2,960	5,300	5,200
Ships	25,000	—	—	—	—
TOTAL	532,300	557,000	139,160	97,900	114,700
Exports	119,400	6,900	—	—	—

Source: P.N. Batubara.

increase over the 1974 figure. Studies indicate a 90 million metric ton reserve at this site.

An application for a \$63 million loan to rehabilitate and expand the Bukit Asam operation is under

consideration by the World Bank. Plans call for the mine to reach a break-even point in 5 years and an annual production of 2 million metric tons by 1985. Production is expected to support increased industrial growth in the area.

The Ombilin area near Padang, Sumatra, consists of mining rights for 2,332 hectares and exploration rights for an additional 20,647 hectares. Tunnel mining is the primary extraction method. Production in 1975 was 76,095 metric tons, a 3% decrease from the 1974 figure of 78,805 metric tons. Reserves are estimated to be 100 million metric tons at the present location with the possibility of an additional 100 million metric tons at an adjacent site.

Feasibility studies are still being conducted but present projections call for capital improvement of \$35 million and a 1985 production level of 650,000 tons.

Riotinto Bethlehem Indonesia (RBI) started as a joint venture with Rio Tinto Zinc (U.K.) and Bethlehem Steel (U.S.), but Bethlehem withdrew in January 1976. RBI has exploration rights on over 40,000 square kilometers in Sumatra and a temporary survey permit for additional land on Sulawesi. The firm also works with mining permit holders in mineral exploration. RBI has reported a coal deposit of 100 million metric tons in West Sumatra but does not regard the deposit as feasible for exploitation under present market conditions.

Shell Mijnbouw, N.V. of the Care Koninklinjki Shell Groep (the Netherlands) is completing plans for a new coal mining operation in Sumatra at Bukit Asam near Palembang. The field covers over 430,000 hectares and is projected to be producing 2 million metric tons by 1980, and over 10 million metric tons by 1985. When in full production output will be 20 to 25 million metric tons annually. In 1975 Shell Mijnbouw became the first firm to sign a production sharing contract with the State mining company, P.N. Tambang Batubara.

Other coal exploration is being conducted by the Geological Survey of Indonesia. Survey work was completed in South and West Sumatra in July 1974 and exploratory drilling in these areas was scheduled for completion in mid-1976.

Several foreign firms have expressed interest in participating in coal mining but the Government is not permitting additional foreign investment.

Copper.—Indonesian copper mining was hard hit by falling world prices in 1975. After dynamic growth in 1973, when both production and export earnings rose nearly 70% over the previous year, the decreases in 1974 and 1975 were felt even more acutely. Although 1975 production of copper concentrates dropped only 3.6%, from 212,600 metric tons to 204,900 metric tons, depressed world prices

caused export earnings to fall 46%, to \$67.8 million, the lowest level in more than a decade. Prices are expected to rise slowly, but it will take several years before the industry fully recovers.

Japan imports nearly 70% of Indonesian copper production, and West Germany purchases most of the remainder.

There are no immediate plans for smelting in Indonesia, and industry sources say that such operations are 10 to 15 years in the future.

In 1976, only one copper mine, Freeport Indonesia, was in production. Explorations are in various stages of completion in Sulawesi, West Java, East Nusantara, and West Kalimantan.

The Government is receptive to foreign investment in copper exploration.

The Freeport Indonesia mine, located in Irian Jaya, began production in 1972 with proven deposits of 3 million tons of copper ore. Open-pit operations are considered feasible until 1981. Although Freeport is considering expansion to underground operations, the recent price slump will probably cause those plans to be postponed temporarily.

Freeport recently discovered a mineral deposit east of the present mine. The size and grade of the deposit has not been fully determined, but initially development planning calls for installation of an extensive system of conveyors and mine transport equipment in order to use present milling, transportation, and shipping facilities. Additional excavators will be purchased.

The present mine site includes a copper mill, laboratory, self-contained maintenance and supply facilities, power plant, port, airstrip, and a 115-kilometer access road that was cut through jungle, swamp, and mountains. The project cost was \$170 million. Freeport has developed a nearby workers' community, providing programs in education, health, agriculture, and technical training.

Freeport Minerals (U.S.) owns 87% of Freeport Indonesia. The remaining shares are held by Norddeutsche Raffinerie (Germany) and South Pacific Copper (the Netherlands). In 1975 the Government requested equity in the firm, and plans are underway to sell an 8.5% interest to the Government.

P.T. Tropic Endeavor Indonesia, a joint venture with The Endeavor Oil Company (Australia) and N.L. Kennecott Copper Exploration Ltd. (Australia), has received encouraging results from surveys and test drillings at a 282,000 hectare site in Northern Sulawesi. Tropic Endeavor is also involved in explorations with several domestic mining permit holders. South Sulawesi Mining Corporation, a mining permit holder working with Riotino Bethlehem Indonesia, completed survey work in South Sulawesi and in 1975, began exploratory drilling.

Iron Sands.—All iron sands are mined by P.T. Aneka Tambang, the State mining company, from sites on the south coast of Central Java near Cilacap. Production peaked in 1974 at 365,000 metric tons, a 30% increase over the 1973 figure. This was accompanied by a 38% increase in gross earnings, which rose from \$1.3 million in 1973 to \$1.8 million in 1974. Production decreased by 3% in 1975 and an estimated 4% in 1976, but rising world market prices are expected to result in an earnings increase of about 5%. Contracts with Nippon Kokai (Japan) guarantee a market for 300,000 metric tons of iron sands per year through 1981.

Surveys have revealed iron sands reserves of 230 million tons near Jojakarta. Feasibility studies are being conducted there by P.T. Aneka Tambang. The Geological Survey of Indonesia (GSI) is conducting other systematic explorations along the outer margins of the Indonesian archipelago.

Iron sands mining and exploration is not open to foreign investment, but the Government has encouraged foreign participation in production of iron and steel. (see Metallurgical and Metalworking Industries).

Manganese Ore.—The peak year for manganese production was 1974 when output totaled 18,200 metric tons. Between 1974 and 1976 Japanese buyers reduced their purchases causing production to drop 45%. Even with this cutback, production is estimated to have exceeded demand and several companies are reportedly stockpiling excess output. However, gross earnings continued to rise and reached \$900,000 in 1975. Earnings are expected to remain at about this level in 1976.

Manganese ore is extracted from several small mines located in West and Central Java. Surveys by P.T. Gama Karya, a domestic mining permit holder, have located a 2,000 hectare deposit of 150,000 tons near Pulau Doi but the uncertain market will make it difficult to obtain financing for a mine of that size. P.T. Miga Lima, also a domestic mining permit holder, is conducting explorations on a 4,000 hectare site in Bima, Sumbawa, West Nusantara. Reserves are estimated at 50 million tons of manganese and 40 million tons of perlite. P.T. Miga Lima is exploring possibilities for cooperation with domestic and/or foreign firms for the processing of these minerals.

The small volume and irregular shapes of present manganese deposits render highly mechanized methods unprofitable. Most manganese mining is done in stages:

1. Earth excavation and removal is mechanized primarily with bulldozers;
2. Tunneling for the main tunnel is done with explosives while crosscut tunneling is done manually;

3. Ore excavation and removal is done manually;
4. Ore breaking, sifting, cleansing, and selection is done manually.

Foreign participation in manganese mining is not permitted on Java, Madura, or Bali.

Nickel Ore.—In 1976 all production of nickel ore was at the State-owned P.T. Aneka Tambang mine in Southeast Sulawesi. Although production dropped 10% annually between 1974 and 1976, from 878,900 metric tons to 700,000 metric tons, rising prices kept gross export earnings increasing rapidly, from \$9.8 million in 1973 to an estimated \$29.6 million in 1976. However, the exclusive buyer, Sulawesi Nickel Development Company, which represents a group of Japanese smelters, has cut its contractual obligations almost 30% for the next 2 years, and both production and earnings may decline unless new markets can be found.

Nickel ore is mined by selective strip mining using a combination of labor-intensive and semimechanized methods. Reserves at the P.T. Aneka Tambang mine and an adjacent site are estimated at 15 million tons with mine life projected at 15 years. Additional reserves at Halmahera are estimated at 60 million tons.

A ferro-nickel smelter began production in March 1976 but its immediate effect on mining operations is uncertain (see Metallurgical and Metalworking Industries). Japanese buyers, who initially were expected to absorb all output, have now indicated interest in only one-fourth of production, leaving P.T. Aneka Tambang, the smelter's operator, with the necessity of developing new markets before full production can be reached.

P.T. International Nickel (INCO), a subsidiary of International Nickel Company of Canada Ltd., and six Japanese partners will begin operations at a large mining and refining facility in South Sulawesi in late 1976. The \$840 million project is being built in two phases, the first having an annual production capacity of 17,600 metric tons. The second stage is scheduled for completion in 1978 and will quadruple capacity to 75,000 metric tons. Three of the Japanese partners have contracted to purchase the entire output through 1991. The second phase of the project will also include construction of a 55 megawatt hydropower facility (See Electric Energy). Contractors for the project include: Dravo Corporation (U.S.) for planning; Montreal Engineering Company, Ltd. (Canada) for electrical power plants, International Design Consultants (Indonesia) for local development; and Chicago Bridge & Iron Company (U.S.) for additional work. The prime contractor is Bechtel Inc. (U.S.).

The Indonesian Government has requested equity in the facility, and arrangements have been completed for acquisition of 20% ownership by the Gov-

ernment through proportional sales by the original owners.

Inco is also building three villages for the 9,000 project employees, including roads, water supply, schools, recreational facilities, and government offices. Interest-free credit to purchase housing is available to employees.

P.T. Pacific Nickel Indonesia is a joint venture involving U.S. Steel (U.S.)—48% equity, Hoogovens (the Netherlands)—24%, Newmont Mining (U.S.) 17%, and Sherritt-Gordon Mines (Canada)—11%. The firm has been working for several years to initiate a large mining and processing operation on Gag Island off Irian Jaya. Deposits in the 141,500 hectare site are considered capable of supporting an annual production of 50,000 metric tons of pure nickel. Project cost estimates were revised in 1976 and are reported to show that capital investment requirements are \$900 million. Development costs of \$40 million have already been incurred for exploration and feasibility studies. Financing arrangements are progressing and include the possibility of a \$50 million loan from the World Bank. Target date for production is 1979. Contractors for the project include: Sherritt Gordon Mines Ltd. for processing; U.S. Steel Corporation for energy resources; Newmont Mining Corporation for the Gag Island project; and Hoogovens for local development. The prime contractor is Bechtel Inc.

The Indonesian Government has approached the project partners with a proposal for 20% equity in the operation, and arrangements are being made for share transfers in proportion to existing holdings. In preparation for the new ownership arrangement, government appointees have been participating in all facets of project management.

Indonesian Nickel Development Company (INDECO) is a Japanese consortium composed of Nippon Steel, Fuji Iron and Steel, Mitsubishi Shoji Kaisha, Mitsui, Nippon Mining, Nippon Yakin Kogyo, Sumitomo Metal Mining, Sumitomo Seioji Kaisha, Yawata Iron and Steel, and Pacific Nickel. The company began explorations on Gebe Island and in 1972 discovered nickel deposits estimated at 60 million tons. In 1974 plans were made for a \$459.5 million operation which was to include a 100,000 metric ton annual capacity ferro-nickel processing plant, airfield, harbor, hospital, schools, housing, and roads. Completion was scheduled for mid-1980. Project financing included equipment and technical assistance. Repayment was to be made over 7 years through shipment of a percentage of the nickel ore to Japan. In September 1975, however, INDECO reported to the Indonesian Government that existing economic conditions necessitated postponement of the project.

Nickel mining is closed to foreign investment.

Tin.—Indonesia is the world's third largest producer of tin, although the 1975 output of 25,200 metric tons of concentrates was far below the pre-World War II annual totals of 44,000 metric tons, and only 70% of the postwar high of 36,000 metric tons achieved in 1954. In 1975 export earnings amounted to \$154 million, an 11% decrease from the 1974 total of \$173 million. After steady increases since 1970, tin production fell in 1975 largely as a result of export restrictions imposed by the International Tin Council. However, a growing world market caused members to put pressure on the Council and in mid-1976 the quota was lifted. Indonesian production is expected to increase almost immediately.

The 1975 International Tin Council restrictions resulted in the need to divide the national quota among several producers for the first time. The issue was further complicated when new producers attempted to base quota claims on capital investments. Although temporary quota allocations were made in 1975, several questions were left unresolved including guarantees for future export allocations.

In 1976, one-half of all tin concentrate production was being smelted in Indonesia. The recent rehabilitation and expansion of P.N. Tambang Timah's smelter will permit the plant to handle all known tin deposits and fulfill the nation's goal of exporting all output as metal by 1980 (see Metallurgical and Metalworking Industries).

A 10-year exploration program which began in 1968 with technical assistance from the United Nations Development Plan (UNDP) resulted in the discovery of major offshore deposits near Bangka, off Sumatra, the center of Indonesia's tin activity.

P.T. Broken Hill Proprietary Indonesia (BHPI), a subsidiary of The Broken Hill Proprietary Company, Ltd. (Australia), specializes in the exploration and mining of tin. Although the original BHPI contract included 466 million hectares on Billiton Island, it has relinquished rights to all but 59,000 hectares in an area which includes Kelapa Kampit, a former Dutch-owned, underground tin mine. The work at the Billiton site includes geological surveys, initial drilling on the entire site and an experimental dewatering program at the Kelapa Kampit mine, which produced 79.2 metric tons of tin concentrates in 1975. However, the International Tin Council quotas were established just as production began and only 12.9 metric tons could be exported.

The Kelapa Kampit mine operation includes an experimental concentrator which is capable of producing 40 metric tons of tin concentrates per year. An evaluation was slated to be made in late 1976 to determine the feasibility of expanding operations.

Continued production will also depend on BHPI being guaranteed a share of future export quotas.

BHPI had applied for general survey rights on the island of Flores, but withdrew after receiving poor results from the initial surveys.

P.T. Koba Tin a subsidiary of Kajuara Mining Corporation Proprietary Ltd. (Australia), has two gravel pump mines at Lubuk Besar and Nibung. The 1975 export controls forced the closing of the Lubuk Besar facility which had been in production less than a year. Previously Koba Tin's production had increased 28% between 1974 and 1975, from 689 metric tons to 882 metric tons. Onshore reserves on 350 hectares are estimated at between 35,000 and 47,000 metric tons, and results of explorations on 2,800 offshore hectares have not been released. All Koba Tin production is marketed and smelted through the State mining company P.N. Tambang Timah. Koba Tin has ordered two 3-meter dredges, one scheduled to begin service in 1976.

Billiton Exploratie Maatschappij Indonesia, N.V., a subsidiary of the Royal Dutch Shell Group (the Netherlands), has offshore contract rights between Bangka and Singkep islands, and has submitted a proposal to begin mining operations there by mid-1978. Reserves are estimated at more than 15,000 tons of tin and will be mined with a \$25 million sea-going dredge on order from ICH (International Construction Holland), of the Netherlands. Special construction features will allow the dredge to operate in monsoon weather and in waters to a depth of 150 feet. When production begins, the Indonesian Government is expected to take a 25% equity. A representative of P.N. Tambang Timah is expected to serve on the board of directors of the new firm.

Tin mining is closed to foreign investment.

Other Minerals.—Several other minerals are mined in varying amounts. Gold production rose 21% from 1974 to 1975, to 321 kilograms, but silver dropped 26%, to 4,758 kilograms.

P.T. Karimun Granite, a joint venture with Bovis, Hong Kong, of British Bovis Engineering, is the nation's only granite mining company. Production in 1975 rose almost 50% to 635,347 metric tons, the vast majority of which is being used in construction of the Pertamina LNG facilities in Aceh and East Kalimantan. The remainder, approximately 25%, was sold in Singapore earning \$723,000. The Pertamina financial difficulties have forced Karimun Granite to increase its marketing efforts in Singapore in order to reach an annual production goal of 2.9 million metric tons.

Three Indonesian subsidiaries of Newmont Mining (U.S.), P.T. Aceh Minerals Indonesia, P.T. Paniai Lake Minerals, and P.T. Baliem Valley Minerals, were considering mining gold, lead, zinc, and chro-

mite in their contract areas of Irian Jaya, but initial survey reports were not encouraging. The Overseas Mineral Resources Development Corporation (Japan) and P.T. Kennecott Indonesia (U.S.) requested and were granted release from general exploration contracts in Sumatra.

PRINCIPAL GOVERNMENT OFFICES

The Government views mineral resources as the property of the nation and maintains strict control over all aspects of the mining industry.

The Directorate-General for Mining and the Director of Mining in the Department of Mining (Jl. Gajah Mada, 8, Jakarta) have responsibility for minerals other than petroleum and natural gas.

Applications for Contracts of Work must receive the approval of the Capital Investment Bureau within the Mining Department (Jl. Medan Merdeka Selatan, 18, Jakarta) before being forwarded to the Capital Investment Coordinating Board (BKPM).

Long-range development aspects of the mining sector come under the jurisdiction of the Directors of Infrastructure Development and Planning of the Department of Mines and the Geological Survey of Indonesia, an activity of the Department (Jl. Diponegoro, 57, Bandung).

There are a number of other organizations with responsibilities related to the mining industry including, BATAN (the national atomic energy agency, Jl. Palatehan I/26, Kebayoran Baru, Jakarta); the National Institute of Geology and Mining, a branch of the Indonesian Institute of Science (Jl. Kapten Patimura, 64, Bandung, West Java); Interdepartmental Committee on Natural Resources Inventory and Evaluation (Jl. Imam Bonjol, 56, Jakarta); and Department of Geology, Bandung Technical Institute (Bandung West Java) are among the most important.

MINING TRENDS, PROGRAMS, AND PROJECTS

Mining has historically played a significant role in the Indonesian economy, and mineral deposits were recognized as an important part of the nation's wealth as early as the turn of the century. Even now, the country's full mineral potential is not known. Political factors have repeatedly affected growth in the mining sector.

Well-run efficient mining operations including copper and coal were initiated under the Dutch Government, and machinery from this period still plays a major role in many of today's facilities. Mining continued during the World War II Japanese occupation at a level sufficient to keep machinery in operating

condition and, following World War II mining operations were able to proceed, although not at the production levels of pre-World War II days.

The period of intense nationalism and political unrest in the 1950's and early 1960's resulted in the loss of much of the technical expertise in the mining industry, leaving most mines badly maintained and ill managed.

Toward the end of the 1960's the Government focused attention on increasing foreign export earnings through mining. The need for heavy foreign capital investment to achieve this goal was recognized. The Government takes the position that incentives offered to foreign investors must be balanced with national development goals of increased Indonesian employment opportunities, expansion of domestic firms, and protection of national resources. Since the mid-1960's with improved management, rehabilitation and expansion of State enterprises, and increased operations by foreign mining companies, production of established mining resources has increased, and new minerals have come into production. Table 4 traces the development of the mining industry in Indonesia comparing production in 1940, the last normal year of the colonial period, with production in 1966 at the end of the era of disruption and decline, and in 1975.

The Foreign Investment Law of 1967 established Indonesia's overall foreign investment policy, including exploitation of mineral resources. However, special regulations applying to minerals other than oil were set forth in Law Number 11 of 1967, which offered foreign investors exploration and exploitation rights under a variety of renewable permits. These were called "First Generation Contracts of Work." Although foreign investors were not granted tax exemptions for corporate income, they were given liberal reductions in tax rates for the first 10 years of operation, and exemptions from import and custom duties for equipment and other machinery needed for their projects. Any equipment no longer needed could be sold in Indonesia or shipped out of the country without export charges. The law also permitted transfer of profits and accelerated depreciation of fixed capital assets. Individual mining contracts also granted foreign mining companies special incentives such as exemptions from export taxes and from the general requirement for repatriation to Indonesia of all export sales proceeds.

The law also provided for certain obligations on the foreign investor, such as:

1. Offering a minimum of 20% equity to Indonesians after 5 years of production;
2. Maximizing employment of Indonesian citizens at all levels;

Table 4.—Indonesia: Development of Mineral Production

	1940	1966	1974	1975
Tin—in concentrates, metric tons (MT), of which tin metal	44,000	12,769	25,631	25,266
Bauxite (MT)	274,000	701,223	1,290,054	992,556
Nickel Ore (MT)	55,800	117,402	878,855	801,012
Gold (Kg)	2,798	128	265	321
Silver (Kg)	46,847	6,867	6,465	4,758
Manganese Ore (MT) ¹	11,900	990	18,228	13,871
Rock Asphalt (MT) ²	8,000	13,905	75,170	75,170
Coal (MT)	2,001,000	319,829	156,153	206,388
Iron Sands (MT)	nil	nil	365,206	352,991
Copper Concentrates (MT) ..	nil	nil	212,620	204,937
Granite (MT)	nil	nil	424,803	635,347
Iodine (Kg)	n.a.	n.a.	25,933	33,077
Kaolin (MT)	n.a.	n.a.	25,972	25,132
Quartz Sand (MT)	n.a.	n.a.	68,403	69,222
Limestone (MT) ³	n.a.	—	1,114,079	1,374,433
Volcanic Sulfur (MT) ⁴	n.a.	n.a.	2,350	3,943
Phosphate Rock (MT)	n.a.	n.a.	5,563	7,902
Marble (Cubic Meters) ² ..	—	—	13,520	19,828

¹ Estimates.

² Only production by cement plants is recorded.

³ Estimated.

⁴ Partial.

Source: Department of Mines.

3. Purchasing certain items of equipment from domestic suppliers;

4. Utilizing domestic processing wherever possible;

5. Involving domestic firms in exploration, mapping, research, and consulting.

In addition, investors were made responsible for land reclamation, the development of infrastructure in areas surrounding the mining facilities, and compensation for people displaced by the operations. Later, contracts of the "Second Generation," solidified and tightened these regulations by raising the Government's share of profits, instituting a sliding scale of increased Indonesian participation, establishing a specific timetable under which all foreign managers and technical personnel were to be replaced by Indonesians, and establishing government ownership for all equipment. Penalties were instituted for non-compliance.

Portions of the law were vague and subject to various interpretations. At first the Government used the ambiguity of the laws to permit liberal applications and foreign investment increased dramatically. However, as profits increased the Government began to tighten up on compliance and to require a larger Indonesian proportion of both profit and participation. In 1973 the Government instituted the Capital Investment Bureau within the Department of Mining to establish tighter review and control over new applications.

In the mid-1970's, the Government began considering a "Third Generation Contract of Work" which would reduce the concessions to investors.

Uncertainty over Indonesian Government intentions, and the tightening world market for minerals made foreign investors wary, and no new foreign investments were made in the mining sector between 1972 and 1975. Additionally, no new major domestic mining investments were made in 1975-76.

The Third-Generation Contract of Work to be offered foreign mining companies is certain to offer them fewer safeguards and incentives than the contracts of the past. The principal anticipated changes include a requirement that foreign earnings be repatriated to Indonesia and converted to rupiahs, and the subjection of mineral commodities to export tax.

There is an additional question of the degree of Indonesian equity participation that may be required in mining projects, 51% being the Government's stated objective in all foreign investments. Its strict application in a time frame of 10 years could seriously restrain the development of large-scale projects in which foreign investment is particularly sought. (Foreign investment is **excluded** from mining projects capitalized at under \$5 million—and \$10 million on Java and Bali.) In practice the authorities have launched the participation policy by seeking minority shares which are represented by Indonesian directors drawn from the State mining companies.

In October 1975 Shell Mijnbouw N.V. signed a production sharing contract with P.N. Batubara. Speculation within the industry is that this contract, representing a departure from prior "Contract of Work" agreements may be a model for future foreign investment in mining. Its provisions include the following:

1. A specific timetable for exploration, feasibility studies, and construction,

2. Cost recovery procedures which allow Shell to keep up to 70% of production for 7 years after production begins and up to 40% thereafter until capital investment is recouped;

3. A 60/40 (Batubata/Shell) split of the remaining production during the initial stages of operation, with a sliding scale thereafter which increases the Government's share;

4. The sharing of production satisfies Shell's principal obligations;

5. Shell also has the responsibility for marketing all output for both partners;

6. Shell is granted relief from import and custom charges for machinery;

7. All equipment acquired for the project becomes the property of Batubara at the time of purchase or import;

8. Shell is permitted to remove only a third of the mineable coal in the production area. Relinquishment provisions will oblige Shell to reduce its operating

area by 75% on June 1, 1976; to 10% of the original 7.1 million hectares on June 1, 1981; and to 5% on June 1, 1983.

This contract requires Shell to give priority to Indonesian suppliers of goods and services used for the project and also includes requirements for the institution of training programs and for 75% employment of Indonesian citizens in all employment categories within 5 years of the initiation of production, providing that qualified Indonesians are available.

By resorting to the production-sharing format the contracting parties sidestepped the export-tax issue which had been blocking the conclusion of new Contracts of Work. The prototype production-sharing contract does not in itself, however, deal with the "repatriation-of-export-proceeds question." It merely requires that such proceeds be paid into a Batubara bank account agreed between the parties and approved by Bank Indonesia. The details of this arrangement are the subject of a private agreement among the three parties, whose content has been announced.

The Batubara-Shell contract does not resolve all issues or provide guarantees that foreign investors are seeking, including protection against forced renegotiation during the life of a contract, but it does provide a basis of discussion for future contract negotiations. Although frustrating to foreign investors who want clear-cut rulings, it is not the first time that the Indonesian Government has been intentionally ambiguous in order to retain the freedom to decide questions on a case-by-case basis.

For investment purposes minerals are classified into three categories. Strategic minerals include oil, tin, nickel, uranium and other radio-active minerals. Mining of strategic minerals can be undertaken only by the Government through a State mining company or a government agency. If the Government is not in a position to conduct such mining activities directly, it may offer a Contract of Work to a third party.

Vital minerals include bauxite, copper, coal, iron, manganese, sulphur, gold, silver, lead, and zinc.

Nonstrategic and nonvital minerals are primarily industrial minerals such as limestone, gypsum, and clay.

Mining of vital and nonstrategic minerals can be undertaken by either domestic or foreign companies. However, certain fields are presently closed to foreign investment.

The current national development plan calls for intensified efforts in exploration, continued expansion of exploitation, and increased domestic processing.

The foundation of Indonesia's future mining growth will be extensive. Indonesian territory is being opened to systematic geological survey. Exploration

methods are becoming more sophisticated and exploration costs per unit of area are escalating.

The Geological Survey of Indonesia of the Department of Mining is responsible for developing the fundamental knowledge of the nation's mineral resources and mapping the geological formations throughout the country. Foreign investors and domestic firms are also involved in exploration. The 1976-77 Mining Development Program calls for expenditures of \$15.28 million (table 5) and includes programs in geological development, \$4.99 million, as well as increased mineral production, \$1.58 million, industrial and mining education, \$2.41 million, and industrial and mining research \$5.13 million. In addition to the major mining projects being planned or under construction, the Government is considering methods of stimulating the development of moderate-size domestic mining operations, which would permit exploitation of a substantial number of deposits that are not big enough to attract foreign investment. Domestic processing of ores will also continue to be a focus of national development strategies.

The Government has acknowledged that foreign capital will be the primary instrument for future development in the mining industry. International Bank for Reconstruction and Development (IBRD) funds are expected to support expansion of coal production, and Soviet financing is expected to support construction of the alumina processing facilities on

Table 5.—Indonesia: Mining Development Program, 1976-77

(in millions of U.S. dollars)

Increased Mineral Production	1.58
Survey of mineral potential in the Gunung Gede area, Jasinga (Bogor)	0.79
Survey of the mineral industry in Sumatra and other areas	0.19
Survey of coal deposits in West Sumatra and East Kalimantan	0.60
Geological development	4.99
General planning project	0.14
Research into and mapping of mineral deposits	0.99
Research on geological and hydrogeological techniques	0.48
Geological mapping and interpretation of aerial photos	0.75
Research on and development of geological activities	0.29
Research on volcanoes	0.55
Improvement of and additions to the Geological Laboratory in Bandung	1.77
Miscellaneous	0.02
Industrial and Mining Education	2.41
Mineral Technology Education Centre	1.69
Oil and Natural Gas Education Centre in Cepu	0.57
Industrial and Mining Research	5.13
Research on/processing of minerals and the development of the laboratory in Bandung	2.25
Oil and Natural Gas Research Project at Cipulir	0.65
Oil and Natural Gas Conservation Project	0.48
Protein Laboratory Project	0.24
Study of the Living Environment	0.20
Miscellaneous Projects	1.31
Other Project Support	1.17
TOTAL	15.28

Source: Department of Mining.

Bintan Island. Other funding sources are being investigated.

Commodity Trade Policy.—Indonesia participates in a number of groups dedicated to stabilizing and improving the conditions of trade in mineral commodities from the producers' viewpoint: the International Tin Agreement, the International Bauxite Association (IBA), the copper exporting countries' group CIPEC (Conseil International des Pays Exportateurs du Cuivre), and the Organization of Petroleum Exporting Countries (OPEC). In International debate, Indonesia supports positions taken on these questions by the developing countries in the "Group of 77" as a matter of principle. Indonesia has generally welcomed the principle of producer-consumer consultation as the basis of commodity programs on the grounds that it gives better results than producer cartels in most cases.

Indonesian membership in groups like OPEC, CIPEC, and the IBA can be regarded essentially as a credential of solidarity with the developing world, since its absence as a relatively small producer of oil, copper, and bauxite might not materially affect their operation.

Indonesian tin production is, on the other hand, significant both on the world market and as a source of foreign exchange earnings, and its support of the Tin Agreement is significant. The Indonesian officials have warmly welcomed U.S. adherence to the Fifth Tin Agreement. They have expressed concern, however, at the possibility that the buffer stock may not receive sufficient consumer support to reach the desired level and postponed their own adherence pending clarification of this question.

MINING GROWTH PROSPECTS

Indonesia is one of the last frontiers for mineral exploration in the world, and potentially one of the richest. The country's large geographical area, rugged terrain, and political history have all contributed to minimal development of its natural resources. At least 20% of the country's land area is considered geologically unexplored, while another 70% has barely been surveyed. Only 10% of its land is geologically mapped, and half of that has been done since 1973. Offshore areas, where rich deposits are being discovered, were relatively unsurveyed before the early 1970's.

Growth of mining in Indonesia will hinge on two major factors: world markets and the role of the Government in the mining industry.

The Indonesian mining industry is extremely responsive to fluctuations in world market prices as demonstrated by the events of the mid-1970's. Fall-

ing prices caused not only an immediate drop in the export market, but a corresponding slowdown in both production and the influx of investment. This situation will continue to be a problem in development planning, as it was during the country's first 5-year plan when, after a good beginning, both mineral production and investment in mining fell short of plan goals.

The role of the Government in the mining industry has traditionally been a major factor in its development. Government authorities constantly weigh the necessity of encouraging foreign investment against that of protecting domestic investment and resources. Foreign investors, however, must balance the disadvantages of operating under changing government controls with their needs for mineral resources.

Technical and financial problems must also be considered. First, mineral deposits at existing sites are becoming increasingly difficult to remove, and are therefore more costly. Present mining equipment in Indonesia is often old and/or technically inadequate, adding to mining costs. Secondly, most new mineral deposits are in remote areas which require the purchase of new equipment and the development of costly infrastructure. The limited amount of domestic funds available for capital investment, and the limited local personnel experienced in mining may also hamper expansion.

However, the Indonesian mining industry is expected to expand as projects already initiated reach production, and as the increasing world demands for mineral resources provide the incentive for capital investment. In addition, Indonesia's need for foreign exchange earnings will make it necessary for the Government to be more careful in its relations with foreign investors.

Growth of the mining industry is expected to be somewhat erratic during the next few years as the Government and foreign investors determine operating procedures that are acceptable to both. However, by 1980 several major projects will have commenced production, new resources developed, and the industry is expected to enter a period of steady growth.

Government projections call for nickel production to increase 6.5% annually during the current national plan and become a major export item. Copper mining production, currently all exported, eventually is expected to supply a domestic smelting market, but even tripling output before the turn of the century would satisfy only 20% of domestic needs. The future for export of bauxite is not considered encouraging, but domestic industry is expected to be able to utilize all output by the year 2000. Indonesian production is expected to supply 50–60% of the

nation's aluminum needs by the turn of the century. The potential for domestic deposits to partially supply the needs of the iron and steel industry appears good.

MARKET SIZE

Total sales of mining equipment increased from approximately \$16 million in 1973 to \$26 million in 1975 (see table 6). Mineral exploration and project initiation resulted in equipment sales of \$26.8 million in 1974, an increase of nearly 70% over the 1973 level, but falling mineral prices and increasing uncertainty regarding operations of foreign investors in Indonesia resulted in a slight decrease in sales during 1975. Although all problems have not been resolved, mining equipment sales are expected to amount to over \$34 million in 1976. The average annual growth rate between 1976 and 1980 is expected to be about 15% and by 1980 total sales are projected to be over \$59 million.

Of the \$26 million total mining equipment sales in 1975, 71% consisted of ore handling and processing equipment, while mining extraction equipment accounted for the remaining 29%. By 1980 it is expected that new projects will result in an increase in sales of extraction equipment, and the sales ratio is expected to be 65% in value of ore handling and processing equipment and 35% in value of extraction equipment.

Imports

Practically all Indonesian mining equipment is imported. Most major Asian, European, and American

types of mining equipment are used. West German mining extraction equipment suppliers were the market leaders in 1975 with a 33% market share, followed by Australian suppliers with 25% and Taiwanese manufacturers with 15%. U.S. firms' sales accounted for only 10% of the market value in 1975. By 1980 it is expected that due to shifts in assembly locations, proximity to Indonesia, and growing expertise in heavy equipment construction, Australian suppliers' sales will grow. Active sales promotion and development of specialized equipment also is expected to allow Japanese suppliers to increase their sales substantially.

U.S. suppliers of ore handling and processing equipment were market leaders in 1975 with a 34% market share in sales of this equipment due mainly to their recognized technical expertise and involvement in the industry's major projects. Japanese manufacturers were second with a 30% market share, and West German suppliers followed with 22%. By 1980, completion of planned projects and expansions at existing operations are expected to result in significant increases in sales of both Japanese and U.S. suppliers with market shares reaching somewhat over 30%.

Domestic Manufacturing

Indonesian manufacture of mining equipment is limited to basic on-site construction and fabrication of handling equipment such as simple conveyor systems.

MARKET OPPORTUNITIES

Good opportunities exist within the mining industry for sales of every type of mining and ancillary equipment, with best potential for exploration and earthmoving equipment. Old machinery will remain in use for basic mining operations, but planned and projected expansion will open new sales opportunities for underground and offshore equipment. Government priorities will create a market for intermediate processing equipment, and the remote locations of new mines will increase sales of equipment needed for the development of infrastructure.

For underground mining there will be requirements for shortwall and universal cutting machines, shovel and slusher hoists, and plows. There is also interest in flotation machines, concentrating tables, classifiers and cyclones, apron, vibrating, and reciprocating feeders, and all types of scrubbers. There is also a market for both ball and hammer mills.

Drilling equipment will continue to be a major sales item including percussion rock drills, core

Table 6.—Indonesia: Size of Import Market for Mining Equipment

(in thousands of U.S. dollars)

	1973	1974	1975	1976	1980
MINING EXTRACTION EQUIPMENT					
United States	500	620	720	1,350	2,600
Japan	2,080	950	1,000	—	—
West Germany	880	2,020	2,500	—	—
Taiwan	800	1,280	1,100	—	—
Australia	750	1,590	1,700	—	—
United Kingdom	480	100	180	—	—
Others	300	250	300	—	—
TOTAL	5,790	6,810	7,500	600	21,000
MINING, ORE HANDLING, AND PROCESSING					
United States	3,040	4,500	6,200	7,500	12,000
Japan	4,850	9,900	5,520	—	—
West Germany	900	3,000	4,000	—	—
Denmark	490	900	1,300	—	—
Italy	200	500	400	—	—
United Kingdom	420	700	880	—	—
Others	200	500	200	—	—
TOTAL	10,100	20,000	18,500	—	—
TOTAL MARKET SIZE	15,890	26,810	26,000	34,300	59,300

Sources: Official Indonesian and supplier statistics and estimates based on trade source interviews.

drills, and bangkatype alluvial drills. These will include both hand held and mounted portable types.

Mining transport equipment will be required including mining cars and dollies, conveying equipment, and heavy earthmoving machinery as well as trucks in the 25- to 45-ton range.

Additional items with market potential include process control instruments, safety devices such as gas detectors and mining helmets, and many types of motors, transformers, and generating equipment.

Much ore currently accessible by strip and surface mining will soon be exhausted, requiring a move to underground mining. Approval of a pending \$63 million World Bank loan will allow P.N. Tambang Batubara to expand underground operations at the Bukit Asam site and possibly also at the Ombilin site. P.T. Broken Hill (BHPI) will begin large-scale underground operations at the Kelapa Kampit mine if present explorations are successful.

Sales of equipment related to dredging will increase as offshore operations expand. New purchases are already planned by P.N. Tambang Timah, P.T. Koba Tin, and Billiton Exploratie Maatschappij Indonesia, N. V., and are being considered by others.

Increased exploration will result in purchases of items ranging from general geological survey equipment to on-site boring and testing equipment, as well as for geological laboratory testing and analysis. New foreign investment, and international assistance programs such as the \$13 million World Bank surveying and mapping project, are expected to focus on exploration.

New mining projects will require development of roads, railroads, harbors, and marine transport. This will lead to needs for heavy construction machinery, as well as for transport equipment such as trucks, railroad cars and locomotives, barges, tug boats and cargo vessels. Development of project-related communities will open the market for prefabricated buildings for medical clinics, schools, and staff housing.

There are also excellent sales opportunities for many types of technical assistance. Government officials have placed a high priority on geological exploration and on domestic ore processing.

IMPORT PROCUREMENT

Buyers' Universe

There are four main groups of mining equipment buyers in Indonesia: the four State-owned mining enterprises; 10 to 15 foreign-owned mining firms engaged in exploration and/or production; dozens of small locally owned mining ventures holding mining permits for exploration and surveys, or engaged in

small-scale production of ore; and about 50 domestic, foreign-owned, and joint-venture firms which provide general and specialized consulting, engineering, and technical support services as contractors to the operating firms in the industry.

The State mining companies are in an organizational transition. Aneka Tambang has already been reorganized from a departmentally controlled "P.N." (State corporation) to the status of an autonomous government-owned limited liability company (P.T.). Tambang Timah is in the process of change, and Tambang Batubara is expected to reorganize by 1979. Although the firms will have increased management autonomy, due to the crucial role of minerals in national development programs, the Government will continue to maintain close control over these companies, including the supervision of expansion and long-range planning.

Equipment requirements are usually ascertained by field management and then sent to the corporate headquarters in Jakarta where specifications are drawn up. For major purchases, open contract bidding procedures are followed. Smaller purchases are made directly from annually budgeted funds. In developing these sales opportunities, it is necessary to make direct contact with both the field operating personnel and corporate headquarters management in order to influence purchase decisions as well as to assist in developing financing.

For government enterprises still operating under the departmentally controlled P.N. status, purchasing is handled through the departmental purchasing officer, but serious consideration is also given to recommendations from field management. Budgets are drawn up well over a year in advance for both major and most smaller size equipment purchases, and in developing sales it is important to study long-range plans for each mining project.

The joint foreign-domestic ventures constitute the largest equipment market in the mining industry. These companies use both open and invitational bidding and direct purchase procedures for equipment acquisition. Government regulations require that purchases by foreign companies operating under Contracts of Work be made from domestic suppliers whenever possible; however, since no specialized mining equipment is manufactured in Indonesia, this requirement has limited impact on procurement of such equipment. These companies are often equipped from the home country of the major foreign partner both for reasons of preference and familiarity. However, financing may influence sourcing. For example, the Canadian-owned INCO project obtained U.S. Export-Import Bank financing and major procurement was tied to U.S. sources. In some large mining ventures all purchases are made by the prime con-

tractor in charge of the project. Information on major mining project status and equipment requirements can often be obtained through the foreign partner's or consultant's regional offices in Singapore or Hong Kong, and contact should be maintained with regional and headquarters offices as well as in the field. The small domestic companies play a relatively minor role in the equipment market as they are usually highly labor-intensive, low-capitalization operations. However, government policy calls for increased support to private domestic mining firms, and their purchases are expected to grow in future years. Suppliers who establish contact with private owners and begin to assist them in developing future expansion programs will be in an excellent position to capitalize on these contacts as the industry develops.

The Government maintains supervision over all aspects of mining operations, both State and private, through the responsible directorate of the Department of Mining, and key departmental officials remain important contacts in any market development program.

Service contractors play an important role in the mining industry, performing as geological consultants, conducting mineral resource surveys, operating geochemical and mineralogical laboratories, providing design and civil engineering services, and performing as prime contractors and handling construction in major mining projects. As well as having specialized equipment requirements of their own, these firms may also influence equipment purchasing decisions by their principals. Service contractors range from multinational firms such as the Bechtel Corporation, and the Dravo Corporation (U.S.) to locally owned specialized firms such as P.T. Geoservices who are geological consultants and operate geochemical-mineralogical laboratories.

Foreign Suppliers' Universe

Mining equipment is sold primarily by three major methods: through permanently established local sales representatives, manufacturer's sales personnel, and direct customer inquiries to foreign equipment manufacturers.

Several suppliers have permanent representation in Indonesia through local agents. Some agents, like P.T. Trakindo, are sole agents for one manufacturer (Caterpillar), while others such as P.T. Masayu Trading & Industrial Company represent several suppliers. Other representatives include P.T. Indoplano, P.T. Alltrak, P.T. Garuda Diesel, C.V. Faasri. Manufac-

turers like Caterpillar who supply machinery in addition to mining equipment have the volume to support an exclusive agent, while firms that manufacture only specialized mining items have found it more advantageous to sell through a firm that offers a wide range of mining equipment.

Many large manufacturers of mining equipment utilize their own sales personnel who make regular trips to Indonesia. Often these sales representatives are based in regional offices at Singapore or Hong Kong, but in other cases they operate directly from home offices in Australia, Japan, Europe, and the United States.

Indonesian purchasers often approach manufacturers and/or agents directly when looking for a specific type of mining equipment. However, this approach is usually based on past experience with the firm's machinery or previous contacts with the company's sales personnel.

West German mining machinery is respected in Indonesia for its solid construction and excellent technical qualifications, particularly such items as heavy duty cranes. West German manufacturers also have the reputation of providing excellent technical assistance and training with their equipment sales.

Japanese suppliers offer a wide variety of items encompassing a full range of price, size, and job requirements. However, the rugged Indonesian terrain takes a heavy toll on machinery from Japan and users report frequent breakdowns. Japanese sales personnel are reported to be very attentive before sale but difficult to locate when after-sales service is necessary.

Australian machinery is rapidly gaining a reputation for good quality. Australian technical personnel have a reputation for patience, interest, and the willingness to work with field managers to find creative solutions for technical mining problems.

Taiwanese mining equipment is considered by Indonesian users as reasonably priced and adequate for basic tasks, but not as solid in construction as machinery from Europe or the United States.

All major supplier firms use direct sales contacts, whether by agents or company personnel, as their major marketing method. Japanese manufacturers have provided financial support for mining projects as a major means of selling equipment. Japanese and several Eastern European country suppliers have displayed mining machinery at the annual Jakarta Fair.

Listed below are major producers of mining equipment in Indonesia:

Austria	Taiwan
Volst-Alp	Taiwan Machinery
Australia	Manufacturing
Sperry-Vickers	Corporation
Germany	United Kingdom
Demag	Ruston-Bucyrus Ltd.
Holman	Sperry
Krupp	United States
Mercedes-Benz	Allis-Chalmers
Rheinstahl	Acker Drill
Japan	Bucyrus Erie
Hino	Caterpillar
I.H.I.	Euclid
Isuzu	Fiat-Allis
Kawasaki	Ford
Komatsu	Harnischfeger
Mitsubishi	Joy Manufacturing
Nissan	Kenworth
Toyota	Mack
The Netherlands	Massey Ferguson
I.H.C.	Michigan
Sweden	Northwest
Volvo	Joint Venture
	Kimco-Komatsu
	(Japan)/International
	Harvester (USA)

Marketing Factors

The majority of mining equipment sold in Indonesia is purchased on special order. The relatively small volume of Indonesian sales has kept manufacturers from carrying extensive stock in either Indonesia or nearby Singapore, and most orders are shipped directly from manufacturing or assembly plants. Because most mining sites are in remote locations, equipment is often shipped directly to the mining operations rather than through Jakarta.

Price is an important consideration in mining equipment purchases but not the main factor. Durability and technical capabilities are primary factors, and price is usually considered on a cost per year of operation basis. Manufacturers who are able to offer financing arrangements as part of sales proposals have a distinct advantage in supplying mining equipment.

Most Indonesian purchases of mining equipment are planned well in advance of their need in anticipation of long delivery times. In supply of standard items like trucks and medium-size earthmovers, Japanese and Australian suppliers have some advantage, but with heavy duty and specially ordered equipment, buyers are prepared to wait in order to obtain specified equipment. However, delivery dates quoted by a supplier should be kept if future sales are expected.

Equipment is usually sold in Indonesia with standard warranties, service, parts, and technical assistance guarantees, but the remote locations of mine sites and limited technical personnel available in Indonesia have made service a sensitive question for both suppliers and equipment users. Mine site man-

agers often relate incidents of long delays and wasted time awaiting repairs or parts. The most successful supplier firms in Indonesia have good reputations for providing equipment service and technical assistance.

The Government gives high priority to the training of Indonesians in all aspects of mining projects. This will become more important to foreign investors as mining operations expand into new methods and require greater technical capabilities. Technical assistance is needed at all levels including machinery operation and maintenance, process engineering, and mining administration. Training also is needed in geological surveying, mapping, and ore testing.

The vast majority of mining equipment is sold as part of project contracts, and most equipment sales are made by suppliers in the country from which financial support is provided. Japanese consortiums have been very active in offering financing for mining projects which often include both the supply of equipment and mine output purchase guarantees.

COMPETITIVE POSITION OF U.S. SUPPLIERS

American companies have played a major role in the development of the Indonesian mining industry. The presence of a large number of American consultants and engineers in Indonesia has built a strong reputation for U.S. technical expertise, and the performance of American mining equipment has resulted in its acceptance as reliable and durable.

U.S. mining equipment sales have been hindered, however, by the apparent lack of marketing efforts by U.S. suppliers. American manufacturers are criticized for uncompetitive financing, delays in delivery agreements, and inadequate service and spare parts availability.

American mining equipment suppliers can improve their sales by increasing personal sales contacts both with onsite mine management and company office officials. Mining engineers capable of demonstrating equipment and providing new ideas for its use could be most effective in making these sales contacts.

Sales opportunities can also be developed by assisting the Indonesian Government in its training programs. Assistance is needed in the design of technical education programs, and the organization of classes to train new mine workers and upgrade the abilities of present employees. These training activities will result in familiarity with the equipment used and an increase in its sales.

Technical seminars on mining technology, mine management, planning and operations offer an excellent opportunity for U.S. suppliers to increase equipment sales. Groundwork for future sales can

be established through the use of educational films which demonstrate new processes and the capabilities of recently developed machinery. In addition seminar themes on subjects such as geological exploration and ore testing could develop sales of related equipment.

American mining equipment suppliers should also follow international organization mining assistance projects in Indonesia, and submit sales proposals for them in the early stages of negotiation to take advantage of these large sales opportunities.

A very important factor in mining equipment sales development is the establishment of dependable sales and service representation. Effective representation can establish the relationships necessary to develop strong and continued sales.

PETROLEUM INDUSTRY STRUCTURE AND SIZE

Oil has had a major impact on both the internal life and the external relations of Indonesia. In 1975 petroleum brought in \$5.3 billion of gross foreign exchange earnings, accounting for 73% of the nation's foreign income and 57% of domestic income. In addition, petroleum exploration in previously unmapped and often unexplored territory has uncovered resources other than oil and has led to increased development in the outlying regions. For the first time in several decades, large numbers of foreign investors began to establish themselves in the country.

Although crude oil production increased over 62% between 1970 and 1975, growth has been erratic. It increased 13% from 488.5 million barrels (bbl) in 1973 to 501.8 million bbl in 1974, and was followed by a 5% decline in 1975 to 476.8 million bbl. Difficulties between foreign contractors and the Government will probably hold 1976 gains to 6%. However, if contract problems can be resolved, discoveries of new sources are expected to result in an increase to 770 million bbl by 1980.

Gross foreign exchange earnings from oil exports have played an increasingly important role in the domestic economy and have reflected both the rapidly changing world oil prices and production fluctuations. The 1973 earnings of \$1.7 billion increased over 200% by 1974 to \$5.2 billion, but were held to a 2% gain in 1975.

Over 85% of Indonesia's oil exports are destined for the United States or Japan with an assortment of Asian, European, and Latin American countries purchasing the remainder (see table 7). A shift began in 1970 in the proportion of oil sold to Japan as compared to the United States. In 1970 Japan purchased 72% of Indonesia's output while only 13% was exported to the United States. In the following years, as U.S. petroleum producers and service contractors increased their activities, the Japanese share dropped steadily and sales to the United States increased until by mid-1976 Japan received 53% and the United States took 34%. This trend is expected to level off and by 1980 purchases from Japan are expected to account for 55% of total sales and U.S. buyers are expected to take 35%.

Indonesia, once 5th among the oil-producing nations in the world, now ranks 14th with output that represents only 2% of the world's petroleum production. Known reserves are estimated at 15 to 17 billion barrels which is only about 2% of the world's total reserves. However, 90% of Indonesia territory has not yet been geologically surveyed. New discoveries such as those announced in 1974 by Arco, Caltex, Conoco, Huffco, Stanvac, and others have given rise to the hope that oil reserves may be much higher than originally estimated. In the early 1970's Indonesian oil reserves were predicted to last about 15 years, an estimate which was later reduced to as low as 5 to 7 years. However, with the new finds of 1974 and the 71 successful drillings in 1975 some geologists are predicting a 30 to 40 year supply.

There have been several successful offshore explorations in recent years. Seven offshore fields, all situated in tertiary basins, have been located. These are concentrated in five areas listed on the facing page.

Table 7.—Indonesia: Crude Oil Exports, by Country of Destination

Country	1970		1973		1974		1975		1976		1980	
	Millions of bbl	% of Total	Millions of bbl	% of Total	Millions of bbl	% of Total	Millions of bbl	% of Total	Millions of bbl	% of Total	Millions of bbl	% of Total
Japan	167.79	72	263.97	71	234.83	62	178.25	49	230.92	53	496.90	55
United States	29.84	13	79.67	22	100.28	27	129.15	36	148.14	34	316.21	35
Trinidad	n.a.	—	18.63	5	35.55	9	37.74	10	43.57	10	72.28	8
Others ¹	35.16	15	7.27	2	8.25	2	17.94	5	13.07	3	18.07	2
Total	232.79	100	369.54	100	378.97	100	363.08	100	435.70	100	903.46	100

¹ Including Italy, Singapore, Philippines, Thailand, Australia, U.K., The Netherlands, and others.

Source: Department of Mining, estimates based on industry sources.

East Kalimantan:	Attaka (Union)	Kutei Basin
	Bekapai (Total)	Kutei Basin
Northwest Java:	Ardjuna (ARCO)	North West Java Basin
	Cinta/Kitty (IIAPCO)	Sunda Basin
Northeast Java:	Poleng (Cities Services)	North East Java Basin
Far South China Sea:	East Udang (Conoco)	Natuna Basin
Irian Jaya:	Unnamed (Phillips)	Salawati Basin

Although all petroleum operations are the responsibility of Pertamina, the national petroleum company, much of the production and exploration is conducted by foreign firms operating as contractors to Pertamina. These contractors include: Aqip Spa Indonesia (Italy), Aminoil Indonesia, Inc. (U.S.), Amoco Indonesia Petroleum Co. (U.S.), Amoseas Indonesia, Inc. (American Overseas) (U.S.), Aquitaine Indonesia (France), Asamera Oil Indonesia, Ltd. (Canada), Ashland Petroleum Indonesia, Inc. (U.S.), Associated Australian Resources N.L. (Australia), Atlantic Richfield Indonesia, Inc. (ARCO) (U.S.), Bow Valley Industries, Ltd., British Petroleum (BP) Development of Indonesia, Ltd. (U.K.), P.T. Caltex Pacific Indonesia, Indonesian Cities Service, Inc. (ICSI) (U.S.), Continental Oil Company of America (CONOCO) (U.S.), Indonesia Gulf Oil Company (U.S.), Roy M. Huffington, Inc. (HUFFCO) (U.S.), Independent Indonesian American Petroleum Company (IIAPCO) (U.S.), Indonesia National Consortium Activity, Ltd. (INCA) (U.S.), Indonesia Offshore Operations, Inc. (IOOI) (U.S.), International Oil Ltd. (Australia), Japex Indonesia, Ltd. (Japan), Mobil Oil Indonesia, Inc. (U.S.), Moncreif Pexpac, Inc. (U.S.), North Sumatra Oil Co., Inc. (U.S.), Petromer Trend Corporation (U.S.), Pexamin Pacific, Inc. (U.S.), Refining Associates Canada, Ltd. (Canada), Shell (Kaltim, Sunda, Sulawesi) N.V. (Netherlands), P.T. Stanvac Indonesia (U.S.), Indonesia Sun Oil Company (U.S.), Tenneco Indonesia, Inc. (U.S.), Tesoro Petroleum Corporation (U.S.), Total Indonesia (Compagnie Francais du Pétrol) (France), and Union Oil Company of Indonesia (U.S.).

Pertamina produced only 6.8% of the nation's crude oil while eight U.S. affiliated firms accounted for 85%. Caltex (U.S.) was the largest single producer with 63.6% of total 1975 production (see table 8). However, foreign employees in 1976 accounted for only 8% of the 60,000 persons employed by producers and service contractors.

Natural gas is expected to become a significant foreign exchange earner for Indonesia. Output in 1975 was 222 billion cubic feet, the majority of which was flared or capped with a small amount being utilized for energy and as feedstock in the production of chemical fertilizers. Four projects pres-

Table 8.—Indonesia: Crude Oil Production by Company
(in millions of barrels)

Firm	1974	1975	% Change	% Total Production
ARCO	32.66	28.68	-12	6.00
Asamera	7.05	6.11	-13	1.29
Associated Australia ...	.52	.43	-17	.09
Caltex	331.87	303.39	-8	63.61
Cities Service	—	.11	—	.03
Huffco .....	.92	3.87	+322	.82
IIAPCO	19.78	15.25	-23	3.18
Lemigas .....	.36	.31	-15	.07
Pertamina	40.14	32.59	-18	6.83
Petromer Trend	11.09	23.02	+107	4.80
Phillips	—	.03	—	.01
Stanvac	17.04	14.19	-16	2.98
Tesoro	2.57	3.09	+20	.64
Total .....	.82	6.91	+737	1.45
Union/Japex	37.02	39.07	+5	8.20
TOTAL	501.84	477.05	-4.9	100.00

Source: Department of Mining.

ently under construction will result in a more important role for natural gas in the Indonesian economy.

Two processing plants, one under construction by Mobil-Pertamina at Arun, Aceh, and the other by Huffco-Pertamina at Badak, East Kalimantan will result in large exports of liquefied natural gas (LNG). Production is scheduled to begin at Badak in early 1977. At Arun, condensate shipments will begin in the fall of 1977, LNG production in 1978, and full production is expected in the mid-1980's.

At the Arun project, plans are to separate the gas and condensate in the field, then transport these products by separate pipelines to the LNG plant. There will eventually be four producing clusters at the field site. The project includes the construction of a 16-inch gas pipeline and a 42-inch condensate pipeline over a distance of 20 km.

By mid-1976 equipment purchases at Arun had exceeded \$116 million distributed as follows:

Supplier Country	Thousands of dollars
Japan	\$52,348
United States	49,600
United Kingdom	9,089
Germany	2,491
Italy	1,161
Belgium	361
Thailand	276
The Netherlands	193
France	179
Singapore	62
Australia	18

Propane and other natural gas liquids will be produced at two other new plants: the ARCO plant offshore of West Java, and the Union LNG plant offshore near East Kalimantan. Both projects are scheduled to begin production in 1976. The U.S. partners in these projects have also designed and constructed

them. (For details on these projects, see Chemical Industries in this survey.)

There are three operating groups in the Indonesian petroleum industry: (1) Pertamina, the national petroleum corporation, (2) foreign corporations, and (3) service contractors. Pertamina (Perusahaan Negara Pertambangan Minyak Dan Gas Bumi Nasional) was chartered on August 20, 1968 in an attempt to bring organization, efficiency, and control to the oil industry. Pertamina produces oil, controls the international and domestic petroleum distribution systems, and owns the nation's refineries which produce approximately 100 million bbl annually. In addition Pertamina represents the Government as the contractor in all foreign oil agreements, and supervises the operations of foreign oil contractors and service companies. Pertamina owns and operates a shipping fleet of over 1.5 million dead weight tons (DWT) and is the largest single industrial employer in the nation with over 42,000 employees.

The firm is also involved in 18 domestically based joint ventures, 6 foreign based joint ventures, and 6 subsidiaries which include a wide range of activities such as a communications system, aviation service, and various contracting and consulting services (see

table 9). In addition to its petroleum related activities, Pertamina became involved in many other ventures including ownership of office buildings, housing, medical facilities, schools, hotels, tourist ventures, recreational operations such as golf courses, a \$150 million rice growing and milling operation in South Sumatra, and a restaurant in New York which specializes in Indonesian cuisine.

Pertamina's shipping fleet consists of an international tanker fleet, a domestic tanker fleet, and many smaller cargo and service vessels.

The international tanker fleet includes owned, hire-purchase, and time charter vessels, and is used to transport non-Indonesian crude in the international market. The changing world oil market has made tanker operations unprofitable, and the Government has begun negotiations to reduce the size of the fleet.

The domestic tanker fleet is used to transport Indonesian petroleum products to both foreign and domestic markets. Total tonnage in 1975 was 1,233,353 DWT, which represented 118 ships including 35 international tankers. The domestic fleet is expected to grow steadily until at least 1980 (see also Transportation).

Table 9.—Indonesia: Pertamina Affiliates

Firm	Production	Particulars	
		% Pertamina	% Foreign Partner
Joint Ventures, Domestic			
P.T. Arun Natural Gas Liquefaction Co.	Plant Liquefied Natural Gas (LNG), Arun Aceh.	55	Mobil (USA) 30 Jilco (USA) 15
P.T. Badak Natural Gas Liquefaction	Liquefied Natural Gas (LNG), Bontang, East Kalimantan.	55	Huffco (USA) 30 Jilco (Japan) 15
P.T. Brown & Root Indonesia	Design, construction, and fabrication for petroleum industry.	20	Brown & Root Inc. (USA) 80
P.T. CBI	Furnish metal plate, processing equipment construction services.	50	Chicago Bridge & Iron Co. (USA) 49
P.T. Dresser Magcobar	Mud for oil drilling	10	Dresser Magcobar Div. of Dresser Ind. (USA) 90
P.T. Sarana Serat Kimia	South Sumatra. 100,000 tons of paraxylene and 120,000 tons of dimethyl telethalate (DMT) annually.	60	P.T. Sempurna 10 Teijin Ltd. & Toyo Menka 30
P.T. Nippon Steel Construction Indonesia (NISCONI)...	Fabrication, assembling, and construction of steel structure for onshore & offshore drilling.	10	Nippon Steel Corp. (Japan) 90
P.T. Patra Vickers Batam Island	Engineering Services for oil, mineral processing, extraction, and other industries.	50	Vickers Ruvolt Pty., Ltd. (Australia) 50
P.T. Permiko Engineering & Construction	Cilacap, Central Java. Fabrication, installation, and construction of pipelines for petroleum industry. Drilling, production and distribution. Design, inspection, testing, repairing, and storage services.	10	Nippon Kokan KK & Mitsubishi (Japan) 90
P.T. Pertanfenikki Engineering	Engineering consuting	30	Japan Gasoline Co., (Japan) 60
P.T. Purna Bina Indonesia	Engineering consulting	51	Bechtel, Inc. (USA) 49
P.T. Sankyu Indonesia International	Fabrication, assembling, installation, and construction of pipelines and steel structures.	10	Sankyu Inc., Tokyo (Japan) 90
P.T. Toyo Kanetsu Indonesia	Engineering consulting. Design manufacture, fabrication, and construction.	51	Toyo Kanetsu, (Japan) 35

Table 9.—Indonesia: Pertamina Affiliates—Continued

Firm	Production	Particulars	
		% Pertamina	% Foreign Partner
P.T. Perjahl Leasing Indonesia	Equipment and plant leasing.	51	Perjahl, 49
P.T. Patra Supplies and Services	Batam Island Catering Service.	51	Patra, 49
P.T. Avlau Indonesia	Oil field equipment, assembly.	51	Avlau, 49
P.T. Uniteer Indonesia	Fabricating and manufacturing.	51	Uniteer, 49
Pexa Oil Company	South & East Kalimantan Oil exploration onshore.	25	Pexa Oil Co., 75
Joint Ventures, Foreign Based			
Far East Oil Trading Co., Ltd.	Crude oil marketing in Japan.	50	Consortium, (Japan) 50
Indonesian Enterprises, Ltd.	Tourist promotion.	50	Several Companies, 50
Japan-Indonesia LNG Import Co. (JILCO)	Supervise LNG imports from Indonesia.	15 (Thru Far East Oil Trading Co.)	5 Japanese Co. End Users, 51; Tokyo Elec & Tokyo Gas, 4; Industrial Bank of Japan, 6; Nissho Iwai, 15; others, 9
Japan Indonesian Oil Kabushiki-Kaisha Tokyo, Japan ...	Supply Indonesian Crude oil to Japan.	50	Tokyo Elec Power, Kansai Elec Power, Chubu Electric Power, Maruzen Oil Co. Daikyo Oil Co., Idemitsu Kosan, 50
Perta Oil Co.	Transport & market Indonesian crude oil.	50	U.S. Int'l Investment Corp. Calif. (USA) 50
Tugu Insurance Co., Ltd.	Insurance.	40	Private Investors, (H.K.), 60
Subsidiaries			
P.T. Elektronika Nusantara (ELNUSA)	Marine, Land, Offshore and Data Processing services.		Wholly Owned
Marine Division of ELNUSA			
Data Division of ELNUSA			
ELCOM Division of ELNUSA			
P.T. Palembang Rice Estate	Palembang, South Sumatra Experimental Rice Project.		Wholly Owned
P.T. Patra Jasa	Provide office space, housing, and land transport for oil and service contractors.		Wholly Owned
P.T. Pelita Air Service	Air Services.		Wholly Owned
Pertamina Gulf Industrial Processing	Fertilizer and other petrochemical packaging.		Wholly Owned
P.T. Pertamina TongKang	Operating and handling nonvessel tankers.		Wholly Owned

Source: Department of Mining, U.S. Embassy, Jakarta.

Pertamina also owns 23 supply ships, 21 towboats, 29 oil barges, 11 mooring launches, 3 cargo ships, 18 barges, 2 water barges, and several other miscellaneous vessels. These ships are operated for Pertamina by P.T. Tongkang and are used for domestic distribution and for servicing the offshore facilities of foreign oil contractors. In 1975, P.T. Tongkang initiated a new system for domestic distribution to areas not accessible to tankers. Integrated barges, 2,800 DWT, have been equipped with containers for a total capacity of 1,440 kiloliters. In October 1975, P.T. Tongkang was also given the responsibility of managing all nontanker floating equipment.

A system of pipelines is beginning to enable more adequate distribution of petroleum products for domestic purposes. The Cilacap Maos-Jogjakarta pipeline was recently finished and a pipeline linking Cilacap and Bandung is scheduled for completion in early 1977. Also scheduled for completion in early 1977 is the pipeline linking ARCO's Ardjuna field to the Krakatau Steel Mill at Cilegon. This latter, a project of Nippon Steel, will cost \$200 million and

will include compressor, booster, and metering stations as well as 132 miles of 24-inch pipeline. Financial support is provided in a 10-year Yen loan obtained from Japan's Export-Import Bank, with Pertamina's crude oil accepted as collateral. Pertamina has also signed a contract with P.T. Propelat, a domestic firm, for construction of a 17-mile, 14-inch pipeline to connect the government-owned fertilizer plant at Palembang with Simpang. Construction is scheduled to begin in early 1977, with total project costs estimated at \$3.6 million.

Actual and projected increases in domestic petroleum demands have necessitated expansion of marine dock and terminal facilities. Three major projects are already underway and others are under consideration:

The Senipah oil terminal, East Kalimantan, will consist of processing, loading, and storage facilities including five storage tanks, each with a 500,000 barrel capacity. A 20-inch pipeline will carry gas from Handil and Bekapai offshore fields 25 kilometers.

A dockyard workshop facility at Dumai, Central Sumatra, will begin operation with repair facilities for tankers and two floating drydocks when completed in 1977.

The Kasim crude oil loading terminal, Irian Jaya, completed in 1976, can handle tankers up to 120,000 DWT.

The Indonesian and Japanese Governments are negotiating for construction of facilities to store Middle East crude in transit to Japan. The island of Lombok is under consideration as a potential site.

Prior to 1968 there were three Indonesian State companies with responsibilities for petroleum production, Permina, Pertamina, and Permigan. Their responsibilities were unclear, resulting in overlaps or leaving gaps in control. A growing awareness of the problem led to the Government's decision to establish one body to coordinate all oil activities in the nation, and Pertamina was created for that purpose.

Pertamina has gone through several stages of adjustment and reorganization as the Government attempts to find the most effective way to develop and yet control growth in petroleum and natural gas production. After an initial period of experimentation, Law No. 8 of 1971, "The Pertamina Law," was passed giving Pertamina sole responsibility for all petroleum activities in the nation, including negotiations with foreign investors and contractors. The law also established the management and financial structures of the company and defined its relationship to the Government.

Law No. 8 of 1971 established a Board of Commissioners to assume responsibility for the overall development of Pertamina. The board is directly responsible to the President and consists of the Minister of Mines serving as chairman, the Minister of Finance as vice-chairman, and the Minister of Development Planning, National Defense and Security, and Industry as members. The Board meets monthly to supervise finances, purchases, and long-range planning. The law also defined the structure under which Pertamina is to share its financial earnings with the Government, including a requirement for payment of 60% of profits from wholly owned operations and a detailed schedule for payment on earnings from ventures with foreign investors.

The Pertamina organization grew rapidly during the early 1970's and, in spite of apparent organizational safeguards it became enmeshed in a series of complicated financial undertakings including the expansion of its international tanker fleet. Rapid changes in the world oil market during 1974 put a sudden stop to Pertamina's growth leaving it with large debts still to repay. To avoid a 1972 government ruling that Pertamina loans must be approved in advance by the Department of Finance, the firm

began making a series of short-term borrowings. However, in 1974 as the corporation continued to expand, rumors began to circulate that Pertamina was in financial trouble, and that its profits were being withheld from the Government. In early 1975, the story of large debts and tenuous financial dealings became public. Early estimates of Pertamina debts were given at \$4 to \$5 billion.

In order to maintain international trust in Indonesia, the Government acted quickly, taking control of all Pertamina's business dealings, assuming responsibility for the company's debts, reevaluating all projects under construction or planned, and requiring a complete audit of books and records. In mid-1976 the Indonesian Government acknowledged that outstanding Pertamina obligations amounted to \$6.2 billion. The ramifications of this debt may be felt in every sector of the economy well beyond 1980.

As a result of investigations, several organizational and personnel changes occurred. In December 1975, Presidential Decree No. 44 was issued which provided stricter government control over Pertamina's activities by giving the Board of Directors stronger authority, establishing a new high-level government post to supervise Pertamina, and placing limits on Pertamina's nonpetroleum related activities. The Decree also included a reorganization of Pertamina's administrative and field offices.

Creditors and international financial agencies have apparently been favorably impressed with the Government's prompt action and have worked closely with it in developing new repayment schedules. Several loans have been obtained through private financial institutions, including an \$850 million loan arranged by Morgan Guaranty Trust, two loans with a total value of \$200 million from Japanese banks and \$1.55 billion in foreign exchange credits provided through Bank Indonesia.

The beginning of a new era for Pertamina was symbolized on April 15, 1976 when the President-Director was replaced by a member of the special commission which investigated Pertamina's affairs.

All foreign oil producers hold contracts through Pertamina with the Government of Indonesia, and are assigned specific areas of operation.

P.T. Caltex Indonesia (Standard Oil of California and Texaco) is one of the oldest Indonesian petroleum producers, and in recent years the largest producer in the nation. Having begun explorations in 1924, Caltex has experienced many stages of development.

Beginning as an independent company, Caltex lost its property during World War II, but regained its control in the late 1940's. Reinvestment and expansion began under a "hand-off" agreement with the Indonesian Government. This working arrangement

was renewed in the early 1950's, and Caltex production went from zero in 1950 to over 200,000 barrels per day by 1960. During the rebellion of 1958 Caltex, located deep in rebel territory, had its facilities temporarily seized.

By the early 1960's, questions were being raised within the Government concerning the amount of profit which foreign investors were earning on Indonesian depletable resources, particularly oil. In response, Caltex and several other leading producers initiated assistance programs within the country such as community development projects and scholarships. In 1963 Caltex signed a profit sharing arrangement with the Government.

In early 1976 Caltex was required to increase its payments to the Government for oil produced, a requirement which Caltex contested. However, in April 1976 Caltex agreed to pay the higher amount on all oil produced retroactive to January 1, 1976, with the condition that negotiations continue. The result of the negotiations were expected to set a future payments patterns for other foreign producers.

Caltex pumping operations are centered near Pekanbaru, Central Sumatra. Its support facilities include a well-equipped hospital and an experimental rice growing estate.

Caltex uses about 600 Reda and Lufkin piston pumps, 600 Texsteam chemical pumps, and 20 Godiva (U.K.) fire pumps. Drilling rigs are Skytop (U.S.) with 15 in operation. Drilling bits were obtained from the U.S. companies Hughes and Rock Bit. Caltex uses about 30 drilling bits per month in their Indonesian operations. Clark compressors are used for two steam recovery units. Some questions have been raised concerning the economic feasibility of steam recovery, particularly in view of the reduced profits being permitted to foreign contractors by the Indonesian Government. However, industry specialists look for its increased use in the future as operations at various fields move into secondary and tertiary recovery in order to sustain production.

Operations and Service Contractors

A major role in petroleum production is played by operations and service contractors. These firms hold subcontracts with the foreign oil contractors for a wide variety of work including fabrication, construction, manufacturing, consulting, equipment supply, maintenance, air transport, and other specialized services. For example, one firm may hold a contract to supply a support vessel and crane; five other companies may operate from that vessel performing such services as maintenance of submersible pumps, and drilling. All of these latter firms may hold contracts with the foreign oil contractor, not with the owner of the vessel. Operations and service contractors

must be registered with the Directorate-General for Oil and Gas, Sub-Directorate for Exploration & Production. In April 1976, 185 foreign firms were registered as operations and service contractors, with U.S. companies accounting for 29% of the total.

P.T. Rig Tenders—Indonesia, began operations in 1973 as a charter service, offering tugs and barges to support pipeline construction and drilling operations. Rig Tenders presently owns six barges, four tugs, and one supply boat. However, it also has access to 30 additional vessels through an arrangement with another company, General Marine of Singapore. The staff consists of 40 crew members and 10 onshore administrative personnel, including 1 foreign employee. Training has been provided for both crew and administrative personnel and the company now is believed to have an excellent Indonesian staff.

P.T. Essarindo Offshore is licensed to provide support vessels for construction and other oil-related activities and serves as the Indonesian representative of Promet Private Ltd., a Singapore shipyard. The firm is 100% Indonesian-owned and has one foreign employee serving temporarily as the manager of operations.

P.T. Satmarindo (Satrya Maritime Indonesia) owns support vessels which are presently operating in the IIAPCO offshore field. Firms similar in operation to Satmarindo are Zapata North Sea which handles drilling rigs, Zapata Marine Services which supplies boats and crews, and Pacific Logistics which handles ships, tugs, and supply boats. P.T. Satmarindo is Indonesian owned and operated. Several of its managers are graduates of universities in the United States, and one foreign employee is providing training and organizational services.

PRINCIPAL GOVERNMENT OFFICES

Government regulation and supervision of petroleum and natural gas production comes under the jurisdiction of the Department of Mining. Specific responsibility lies with the Directorate-General for Oil and Gas (MIGAS). MIGAS is divided into five operational divisions: Exploration and Production, Planning, Safety and Calibration, Economic and Finance, and Future Development. The Government also operates the Indonesian Petroleum Institute (LEMIGAS). The Department of Mining, Secretary-General for Mining, Director for Oil and Gas, and the five operational divisions are all located at the Department of Mining, Jalan M.H. Thamrin 1, Jakarta. The Indonesian Petroleum Institute (LEMIGAS) is located at Jalan Cipulir, (Tromolpos 89), Kebayoran Lama, Jakarta.

PETROLEUM TRENDS, PROGRAMS, AND PROJECTS

For more than 100 years, geologists have trudged through the jungles of Indonesia in search of oil. Although suburban-style communities, complete with swimming pools and shopping centers now stand where temporary camps were once set up, the search still goes on for new sources of petroleum.

Oil exploration in Indonesia began in 1871, but it was not until 1890 that the first successful discovery in north Sumatra led to searches throughout the islands and the founding of the Royal Dutch Shell Company.

In 1924 four Americans, fresh from oil explorations in California, arrived in Batavia, now known by its more ancient name, Jakarta. These men represented the Standard Oil Company of California and had been assigned to Indonesia for 2 years to make contact with the Netherlands East Indies Company and negotiate for oil exploration rights. (Although Standard Oil later established itself in the Middle East, this exploration party was the firm's first venture outside of the Western Hemisphere.)

The Standard Oil team concentrated its geological surveys and mapping efforts in north and central Sumatra, East Java and Kalimantan, then known as Borneo. By 1930 it had made two discoveries worth further study, one in Kalimantan and the other in Irian Jaya (New Guinea) and applied to the colonial government for exploration rights. Two years passed with no word, and then in 1932 permission was granted to Standard Oil of California to become the Government's minority partner for Irian Jaya production.

Finally in 1935, instead of being given rights to the land in Kalimantan where Standard Oil had done 11 years of continuous exploration, rights to 600,000 hectares of land in little-explored central Sumatra was offered to the company. The offer was accepted and in 1936 Texaco joined with Standard Oil of California in the venture which eventually led to the discovery and operation of the largest known oil field in Indonesia. The Minas Field, which is still one of the 25 largest in the world, now produces more than 400,000 barrels per day.

These discoveries attracted foreign interest and the years following were marked by the passage of various laws designed to protect the interests of the Government. By the beginning of World War II, five of the world's seven major oil producing companies were operating in Indonesia under some type of cooperative arrangement: Shell, Stanvac, (Standard Oil of New Jersey and Standard Oil of New York), and Caltex (Standard Oil of California and Texaco). The staffs of these firms were mainly foreign

personnel with little or no provisions for the training of Indonesians.

At the onset of World War II, most foreign personnel left the country, and Japanese occupation forces actually completed the first successful well at the Minas field. Oil production was minimal during the war when compared with capacity, due mainly to Japanese lack of experience in petroleum production. By the end of World War II the heavy Allied bombing attacks virtually destroyed pumping and refining facilities. Although the Dutch were anxious to rebuild the Indonesian petroleum industry in order to provide support for their wartorn homeland, the Indonesian struggle for independence which followed stalled rehabilitation of the industry.

After independence the oil companies were allowed to operate fairly independently, but political pressure began to mount as oil revenues left the country. Tensions came to a climax in 1961 and resulted in the passage of Law No. 44 which stated the position that all natural resources of Indonesia belong to the people and are to be controlled by the Government for the benefit of its citizens. Foreign companies were then required to enter negotiations for the right to continue operations in Indonesia. In 1963, after several months of negotiating, the big three oil producers signed Perjangjian Karya (Contracts of work) which exchanged exploration and production rights for conditions of profit sharing, tax relief, and capital investment recovery. Management decisions remained in the hands of the foreign firms.

However, in 1967 the Indonesian Government submitted new contract proposals based on sharing production rather than profit. The new proposals also provided the Government as represented by Pertamina, a more active role in management of the foreign companies' operations. In addition these new contracts stipulate that all equipment purchased for a project becomes the property of Pertamina, that the foreign company is responsible for all exploration costs, and that a certain percentage of crude oil must be reserved at low cost for domestic purposes. In 1972 the Department of Mining established requirements for the training of Indonesians for the replacement of foreign personnel under penalty of heavy fines for noncompliance.

By 1976 more than 30 foreign companies had signed a total of 60 production-sharing agreements with Pertamina. Production percentage splits range from 65 to 95% for Pertamina. The most recent agreements were signed on July 14, 1975 with Indonesian National Consortium Activity, Ltd. (INCA. Ltd.).

Foreign investors have recently experienced considerable uncertainty in the stability of their contractual arrangements. Some have been forced to renegotiate contracts before expiration dates, and taxes

have been raised at will. In mid-1976, an additional assessment of \$1 per barrel was asked of all oil producers. After Caltex finally agreed to pay with continued negotiations as a condition, several other companies stopped offshore production. This inactivity put severe financial pressure on many of the contractors and service companies, and by late summer some of the firms were sending foreign personnel back to their home countries. Pressure will continue to build as both sides attempt to ascertain if Indonesia needs the foreign advisors, investment, and foreign exchange earnings more than the oil companies need the Indonesian resources.

In August 1976, all major companies operating under production-sharing agreements agreed to a 15% production split. Operating costs are to come out of the producers' 15% share, although reimbursement may be requested from the Government.

An additional difficulty has arisen for U.S.-based oil companies operating in Indonesia under production-sharing contracts. On May 7, 1976, a ruling was issued by the U.S. Internal Revenue Service which stated that the Indonesian share of production was a royalty and not a tax, and therefore not eligible for foreign tax credit. The Indonesian Government began working with the oil companies to amend the contracts to meet the U.S. requirements for foreign tax credit.

Although government plans call for oil and natural gas production to play a significant role in supporting national development, as a result of the Pertamina financial crisis and the negotiations between the Government and producers; several of the scheduled major petroleum and petroleum-related projects are being seriously examined and may be delayed.

Capital expenditures for petroleum and natural gas exploration and development were expected to amount to over \$1 billion. The Government estimates that approximately \$700 million have been invested in petroleum and natural gas exploration and that current annual expenditures for exploration amount to almost \$50 million.

The area covered by seismic surveys rose from 5,000 square kilometers in 1960 to 24,000 square kilometers in 1968. A peak of 102,000 square kilometers was reached in 1969, but the average has been 60,000 per year since that time. Exploratory drilling rose from 52,700 meters in 1968 to 414,700 meters in 1974. Total exploratory drilling amounted to 1,639 million meters by the end of 1974. Exploration efforts were quite high in 1975 and by October included 6,638 million meters offshore, 1,405 million meters onshore, 55,600 meters of exploration drilling, and 28,400 meters of production drilling. Although 1975 drilling figures were about 20% lower than the 1974 totals, oil and/or gas were discovered in 71 of the 182 exploratory wells, the

highest percentage (39%) of success in 6 years. New offshore discoveries accounted for about half the total. The uncertainties of 1976 resulted in a slowdown in exploratory efforts and all drilling rigs were closed during late July. However, it was believed that exploration and production would resume before the end of 1976.

Indonesia's petroleum resources have brought the country into a variety of new international relationships. In addition to the foreign corporations that have established themselves in the nation, Indonesia has become affiliated with several petroleum-related international organizations.

In 1962 Indonesia became a member of the Organization of Petroleum Exporting Countries (OPEC). Although one of the smaller producing members and the poorest in terms of per capita income, 5% of OPEC production is from Indonesia, Indonesia has often maintained an independence from OPEC with regard to policy decisions, and did not support either the 1973-74 oil embargo or the 1975 price increases. However, in 1976 the OPEC Ministerial Conference was held in Bali, Indonesia, and the Indonesian Minister of Mines was elected president of the organization.

Indonesia, along with Malaysia, the Philippines, Singapore, and Thailand, is a charter member of the Council for Petroleum (ASCOPE) in the Association of Southeast Asian Nations (ASEAN). This organization was founded in 1975 to encourage cooperation among its member nations in the areas of petroleum development, joint training and research, international marketing and public relations. Also in late 1975, Indonesia and Thailand came to agreement on the issue of the ocean boundary between the two nations. In 1976 the ocean boundary issue was being negotiated with the new Vietnamese Government.

GROWTH PROSPECTS

Considering that about 90% of Indonesian territory has not yet been geologically explored, and that new drillings have had a 39% discovery success rate, geologists and petroleum companies are enthusiastic about potential petroleum and natural gas development, and are planning on continued growth until the end of the century. Several factors are expected to result in increased demand for Indonesian oil and natural gas products both domestically and in world markets.

Domestic consumption is relatively low, amounting to about 79 million barrels in 1975, with slightly less than half of this amount used for industrial purposes. This represents an increase of over 12% from the previous year.

On a per capita basis, domestic consumption amounts to 0.6 bbl annually compared with over 30 bbl in the United States. Projected industrial development is expected to raise domestic demand, and the rising level of income will result in additional purchases of cars and motorcycles. The Government is predicting domestic consumption of 4 bbl per capita by 1980.

The economic and industrial development of other countries in Asia will also increase demand for Indonesian oil and natural gas products. Indonesia's proximity to these expanding Asian markets should provide a competitive edge over oil-producing countries in the Middle East. In addition, the favorable tariff arrangements of the Association of Southeast Asian Nations will also increase Indonesia's advantage in the region.

European and North American needs will continue to expand, and Indonesia's history of not always adhering to OPEC decrees will enhance it as a source of both crude and refined petroleum products.

There are two major factors which could slow growth in Indonesian petroleum production. First, that geological surveys do not uncover the expected new resources, and second, that relations between the Government and foreign producers become so complex that the latter become discouraged from making the capital expenditures necessary for continued growth.

MARKET SIZE

Total sales of petroleum and natural gas extraction equipment have grown significantly in recent years. In 1974 total sales were \$94 million, an increase over the 1973 figure of \$80 million. In 1975 there was an additional 45% increase, raising total sales to \$136 million. In 1976 total sales is expected to rise to \$149 million. Several new projects are still under construction; others are in the planning stages, and annual increases are projected to be about 14% reaching \$253 million in 1980 (table 10). It should be noted that large amounts of equipment are shipped directly to project sites and are often not reflected in official import statistics. The figures used in this report have been adjusted to compensate for this factor; however, they may be conservative. Equipment listed as "Petroleum and Natural Gas Extraction Equipment" includes items directly related to drilling, extraction and pipeline use. It does not include such items as heavy duty earth-movers used in site clearing and road construction.

Imports

The main suppliers of petroleum and natural gas extraction equipment are Japanese manufacturers

Table 10.—Indonesia: Size of Import Market for Petroleum and Natural Gas Extraction Equipment
(in thousands of dollars)

	1973	1974	1975	1976	1980
PETROLEUM AND NATURAL GAS EX- TRACTION EQUIPMENT ¹					
United States	27,910	29,450	45,000	48,940	82,580
Japan	37,100	47,390	66,020	—	—
Singapore	3,980	4,590	7,180	—	—
West Germany	3,050	2,380	4,300	—	—
United Kingdom	3,010	4,870	5,740	—	—
Taiwan	840	1,240	1,430	—	—
Others	4,430	4,520	6,920	—	—
TOTAL MARKET SIZE ..	80,320	94,440	136,590	149,960	253,090

¹ Includes items directly related to drilling and extraction as well as pipeline equipment. Does not include related items such as heavy duty earth movers used in site clearing, road construction, etc.

Source: Official Indonesian and supplier country statistics, and estimate based on trade source interviews.

who had a 48% market share in 1975 as compared to the U.S. manufacturers' share of 33%. A large amount of Japanese sales are of pipe and pipeline equipment. U.S. manufacturers are the main source for field pumping and related equipment, and they encounter very little competition from other suppliers. Japanese and U.S. suppliers are expected to maintain their respective market shares through 1980.

Domestic Manufacturing

Domestic production of petroleum and natural gas extraction equipment is limited primarily to fabrication of tanks, rigs, and other similar equipment. There is virtually no domestic production of technically advanced equipment in Indonesia, and no investment applications for such production have been filed with the Government.

MARKET OPPORTUNITIES

Sales opportunities in the Indonesian petroleum industry can mean almost anything from the traditional rigs, pumps, bits, and pipes to heavy construction equipment for road building and site construction, as well as other supplies needed for infrastructure development. As a result of petroleum and natural gas extraction being done in very isolated locations, entire communities have been built in jungles or on remote islands with many of the amenities of Western living.

The Indonesian market for extraction-related equipment will include items such as piston pumps, compressors, drilling rigs, chemical pumps, and a wide range of control equipment such as chokes, gages, and other instruments. Sales of cleaning equipment for drilling heads will include desanders, centrifuges, shakers, and washers. There is also a

good market for field testing equipment such as viscometers and specialized pH meters. Viscometers sold in Indonesia are usually the mechanical, funnel type.

For natural gas extraction projects at the wellhead gas source where the gas and condensate are separated, equipment needs include: wellhead flow control chokes and safety valves, three-phase field separators, water absorbers, inlet dryer separators, and molecular sieve dryers. Specific future sales opportunities for LNG equipment will depend on phasing of existing projects and on new project implementation.

Sales opportunities are also good for expendable items such as drilling bits and drilling mud additives. In 1974 sales of expendable items amounted to over \$100 million.

The remote locations of major fields will continue to result in increasing sales of pipeline and related equipment. Primary pipe needs are 12-, 24-, and 36-inch sizes with occasional requirements for 10- and 42-inch sizes.

Road building and similar infrastructure needs will support a continuing market for heavy equipment including bulldozers, dumpers, and loaders. Sumatra and Kalimantan will be the areas of heaviest concentration for these needs.

Dockside storage facilities at present shipping terminals will need to be expanded and additional facilities may be required depending on the locations of new discoveries. Government plans mention possible purchases of, interisland tankers, oil storage depots, tank trucks, and oil port facilities.

Recent government regulations require foreign investors to assume the cost-risk involved in exploration, which will mean that large expenditures will be made for technically advanced equipment in order to permit accurate coverage of large areas. Purchases are expected to include aerial photographic equipment, infra-red photographic instruments, magnetic instruments, and radar devices. Ground surveying will require electronic position finding devices, seismometers, and electronic logging devices for well-to-well correlation.

The increased employment of Indonesians in the petroleum and natural gas production industry will provide service contracting opportunities for training of personnel in both technical and administrative skills. This is a relatively untouched field which offers many possibilities.

Sales opportunities are not limited to equipment required for extraction and exploration activities, but also include a wide variety of equipment needed by service contractors such as barges, tugs, cranes, helicopters, small aircraft, pipe laying equipment, as well as support and maintenance items.

IMPORT PROCUREMENT

Buyers Universe

The buyers' universe in the Indonesian petroleum industry can theoretically be summed up in one word, Pertamina, since the State petroleum corporation is responsible for the supervision of all petroleum and natural gas operations in the nation. However, in practice a large amount of material is purchased directly by the foreign investors, contractors, and service support companies.

The reorganization of Pertamina in late 1975 put stringent controls on purchasing by Pertamina officials and more clearly defined the channels of operation. All major purchases must be approved by the Board of Directors. Once approval has been given, orders are placed through the Procurement Division of the Directorate for Domestic Supply (J1. Medan Merdeka Utara, 13, Jakarta). Both direct purchase and tender procedures are utilized. However, purchase recommendations are usually submitted by the field manager in consultation with the foreign contractor and/or consultant. Purchase contracts are also made through the Pertamina foreign representative offices in New York, Frankfurt, and Tokyo.

Although the above procedures are followed in most petroleum equipment purchases, in many instances it is primarily "rubberstamping" decisions made in the home office of the foreign contractor or consultant, and many purchases are made directly from those offices. In addition, some purchasing is handled through foreign contractor's regional offices in Singapore.

It is therefore necessary in making large sales proposals to study specifications for projects in the planning stages and to contact the Pertamina field manager, the construction supervisor of a foreign contractor, and the consultant or home office of the foreign firms involved.

Purchases by service contractors constitute a significant part of the equipment sales market. Domestic firms can be approached at their administrative headquarters, usually in Jakarta. Equipment purchases by service contractors acting as representatives are often handled by the parent corporation, through both Singapore regional headquarters and foreign home offices. However, proposals can be initiated with the manager of the Indonesian office. If the local manager is interested, the supplier may be provided with an endorsement and a recommendation for the most effective sales procedures to follow.

The heavy reliance on foreign contractors makes it unnecessary for Pertamina to maintain a large in-house technical staff. Both Pertamina and many of the foreign contractors make use of consulting firms

such as Bechtel Incorporated (U.S.), Fluor Eastern Incorporated (U.S.), P.T. Brown and Root Indonesia (U.S.), and Avery-Laurance (Indonesia) Private Ltd. (U.S.). There are also some Japanese consultants, but U.S. firms dominate the field.

Foreign Suppliers Universe

Due to the specialized nature of petroleum and natural gas extraction equipment and the remote locations of Indonesian operations, very little equipment is inventoried except by the users themselves. Equipment is usually shipped directly from the manufacturer to the field site with little or no sales agent activity in Indonesia. Some items such as pipe, gages, valves, and basic spare parts are stocked in Singapore and delivered as needed. The strategic role of Singapore in supporting the Indonesian petroleum industry is very much evidenced in the advertisements in the regional trade journals, such as *Petroleum News*.

Japanese suppliers dominate pipe sales primarily based on price and distance factors. U.S. manufacturers are the major suppliers of drilling, testing, and other oilfield equipment, of which they are often the only producers.

Japanese suppliers generally use production purchase agreements and financial support in their sales offers, while most American equipment is sold as part of proposals made by U.S.-based contractors and consulting firms. An example of a Japanese purchase agreement is that arranged by the Indonesian Government and Japanese suppliers in the form of a foreign investment-joint venture arrangement, the Japanese-Indonesia Oil Company. Under this joint venture agreement the Government of Japan exchanged a 25-year \$234 million loan at 3% interest with a 7-year grace period for concessional rights to 15.3 million barrels of crude oil above current supply commitments during 10 years. The loan is primarily for the purchase of project-related equipment and services. The Japanese-Indonesia Oil Company, based in Japan, was established to handle the delivery and marketing of the crude oil.

Marketing Factors

Price and distance are major factors in sales of heavy, standard oilfield equipment. Transportation charges for shipping such items as pipe from the United States or Europe can add as much as 50% to the cost, making them noncompetitive with the same items from Japanese manufacturers. Price and credit are also important factors in the purchase of drilling and extraction equipment, but since U.S.

manufacturers specialize in production of such equipment, price and credit terms do not usually determine sales.

Equipment delivery has become a problem for all suppliers since new regulations limit assistance by Pertamina. Formerly active in expediting delivery of equipment to field locations, Pertamina has been restricted from direct involvement in import clearance. Contractors and suppliers now encounter normal delays at ports and in obtaining special permission for direct delivery to operational sites. It is not unusual for personnel to be sent to Singapore to hand-carry smaller, urgently needed items.

Warranties and service arrangements have not had major influence on sales due to the direct supervision of most projects by foreign contractors and consultants who usually have direct contact with their suppliers and the necessary expertise to perform equipment servicing. The availability of spare parts, however, can constitute a problem in continued equipment sales with the major factor being dock-side delays for customs clearance rather than availability.

The main factors influencing sales of technologically advanced petroleum production equipment are dependability and quality. The high capital investment required for petroleum production and the remote operating locations necessitate the installation of durable machinery which will run continuously with minimal breakdowns.

The main marketing method is through direct sales contacts with producers, consulting firms, and service contractors. Other sales promotion methods such as equipment demonstrations and seminars are often made at petroleum conferences. Mailings to selected firms are also used, as are advertisements in magazines such as *Petroleum News*, *Southeast Asia*, published in Hong Kong. Other regularly published trade journals include: *The MIVAS Monthly Bulletin*, *Petroleum Intelligence Weekly (PIW)*. The *Petroleum and Mining Report*, all published by KNI News Service, Jalan Matraman, 10, Jakarta: *Pertamina Bulletin*, published monthly by Pertamina Public Relations, Jalan Perwira 2-4, P.O. Box 12, Jakarta.

The Indonesian Petroleum Association, (IPA), Jalan Menteng Raya, 3, Jakarta, is involved in coordinating research and development activities through monthly discussion meetings and an annual convention. IPA has also been working on the production of a geothermal gradient map of Indonesia. Target publication date is late 1976. The project is part of a joint effort with the South East Asia Petroleum Exploration Society to produce a geothermal gradient map of all Southeast Asia.

COMPETITIVE POSITION OF U.S. SUPPLIERS

As long as American contractors, consulting firms, and service contractors play a leading role in the development of the petroleum industry, good sales of U.S. equipment appear likely. A problem which U.S. suppliers sometimes have is taking their leadership position for granted and not making the constant effort to cultivate and maintain the kind of relationships upon which future sales depend. Japanese suppliers, for example, have developed some competitive equipment and made significant inroads into previously solid markets through intensive promotion.

In addition to continuing efforts in contracting and consulting roles, U.S. suppliers should intensify educational programs in both technical and administrative fields. Indonesian purchasers buy equipment with which they are familiar, and training efforts lay a solid foundation for the future when more Indonesian personnel will be responsible for maintaining petroleum production operations. Such programs provide an excellent opportunity for U.S. suppliers to establish product preferences and patterns for future equipment sales.

Both equipment demonstrations and technical seminars offer possibilities to promote capabilities of U.S. equipment, and the willingness of U.S. manufacturers to support the goals of the Indonesian Government. Geological surveying is a field of keen Indonesian interest, and one which is readily adaptable to equipment demonstration or a technical seminar promotion.

Appendix 1.—Indonesia: Mining Industry Service Contractors

<i>Name</i>	<i>Field of operations</i>
National private enterprises	
P.T. Geoservices (Bandung)	Geological consultants; geochemical-mineralogical laboratories
P.T. Sac Nusantara (Jakarta)	Dredging and construction
P.T. Nusantara Consolidated Marine Services (Jakarta)	Onshore/Offshore mineral research
P.T. Asa Engineering Pertama (Kebayoran Baru, Jakarta)	Planning/construction of buildings; surveying and mapping
Superintending Company of Indonesia Ltd. (Jakarta)	Lab. analysis and survey in exploration program
CV Saro Godung (Jakarta)	Geophysical survey
P.T. Lindeteves Indonesia (Jakarta)	Exploratory drilling
P.T. Resources Jaya Teknik Management (Kebayoran Baru, Jakarta)	Engineering Services and Vocational Training
P.T. Geo Consult (Jakarta)	Geological mapping/mineral exploration

<i>Name</i>	<i>Field of operations</i>
P.T. Astakona Alma (Jakarta)	Drilling services
P.T. Soilens (Bandung)	Geological studies
P.T. Entopes (Jakarta)	Surveying
P.T. Kiagoos Trading (Jakarta)	Construction of structures & general mining facilities
P.T. Elektronika Nusantara (Jakarta)	Electronic & data processing services
Joint ventures	
P.T. International Design Consultants (Cilandak, Jakarta)	Engineering consultants
P.T. Caisson Dimensi (Jakarta)	Construction engineering
P.T. Cesco Indonesia (Bogor)	Engineering consultants
P.T. Petrosea International Indonesia (Jakarta)	Contractor to Batubara
P.T. Leighton Indonesia Construction Co. (Kebayoran Baru, Jakarta)	General contracting
Foreign private companies	
Bechtel Incorporated (U.S.A.)	PT Pacific Nikkel—Gag Island
Arman and Larmer Pty. Ltd. (Australia)	PT Pacific Nikkel—Gag Island
Dravo Pacific, Inc. (U.S.A.)	PT INCO—Soroako
Bechtel Pomeroy (U.S.A.)	PT Freeport Ind.—Irian Jaya
Bintang Timah BV (Netherlands)	BEMI BV—Pulau Tujuh
Intersea Research Corp. (U.S.A.)	PT Pacific Nikkel—Gag Island
Dames & Moore (U.S.A.)	PT Pacific Nikkel—Gag Island
Federal Drillers Snd. Bhd. (Singapore)	PT Pacific Nikkel—Gag Island
Diamond Drilling Corp. of the Philippines (Philippines)	PT Pacific Nikkel—Gag Island
B.P.B. Industries (U.K.)	SHELL/P.N. Batubara
Drilling & Prospecting Int. Ltd. (U.K.)	SHELL/P.N. Batubara
Vallentine, Dunn & Co. (Malaysia)	PT Tropic Endeavour
Cargo Superintendents Co. (Australia)	SHELL/P.N. Batubara
Cundill, Meyers & Associates (Australia)	SHELL/P.N. Batubara
Barrie & Dwyer Pty. Ltd. (Australia)	PT Alcontin
Geodetic & Construction Survey Ltd. (Switzerland)	P.N. Batubara
Mining Research Service Organization (Taiwan)	Riotinto Bethlehem
Chicago Bridge & Iron (U.S.A.)	PT Inco
Marine Charters Pk.Ltd. (Singapore)	PT Koba Tin

Source: Department of Mining.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina

Company	Services
A.B.S. Worldwide Technical Services Inc. (N.Y.C., USA)	Consultant.
Alfred A Yee & Associates Inc. (Honolulu, Hawaii, USA)	Construction, Consultant.
American Offshore (S) Pet. Ltd. (Singapore)	Miscellaneous support services.
Amerisian Marine Services S.A. (Singapore)	Miscellaneous support services.
Amsbach Enterprises (S). (Singapore)	Commodities supply and catering, Specialized services, Miscellaneous support services.
Anderson & Mynard (Singapore)	Miscellaneous support services.
Andiamo Enterprises Ltd. (Hong Kong)	Material and equipment supply including after-sales service.
Aquatic Exploration Co. (Dallas, Texas, USA)	Specialized services, Miscellaneous support services.
Arman & Larmer Pty/Ltd. (East New Guinea)	Consultant, Specialized services.
Asia Drilling Company Ltd. (Tokyo, Japan)	Specialized services.
Asiatic Navigation Ltd. (Singapore)	Miscellaneous support services.
Associated Petroleum Supplies (H) Ltd. (Apsco). (Hong Kong)	Consultant, Material and equipment supply including after-sales service, Miscellaneous support services.
Atwood Oceanics International SA. (Houston, Texas, USA)	Consultant, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Ausdrill International (Singapore)	Consultant, Specialized services.
Australian Dredging and General Works Pty. Ltd. (Melbourne, Australia)	Miscellaneous support services.
Australian Offshore Services (Melbourne, Australia)	Miscellaneous support services.
Badger Company, The (Cambridge, Mass., USA)	Consultant, Material and equipment supply including after-sales service.
Baker Eastern SA Indonesia (Los Angeles, California, USA)	Material and equipment supply including after-sales service.
Barrie and Dwyer Pty. Ltd. (Crows, West Australia)	Consultant, Specialized services.
Basic Earth Science System Inc. (Denver, Colorado, USA)	Consultant, Specialized services, Miscellaneous support services.
Bawden Drilling Int. (Singapore)	Specialized services.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina—Continued

Company	Services
Bechtel Indonesia Inc. (San Francisco, California, USA)	Fabrication, Construction, Consultant, Specialized services, Miscellaneous support services.
Bechtel Incorporated (San Francisco, California, USA)	Fabrication, Construction, Consultant, Specialized services, Miscellaneous support services.
Boral Consulting Ltd. (Hong Kong)	Consultant.
Brambles Holdings Ltd. (Sydney, Australia)	Material and equipment supply including after-sales services, Miscellaneous support services.
Broekhoven Overseas N.V. (Zeist, Netherlands)	Construction, Specialized services.
Bst. Brown Boveri—Sulzer Turbo-machinery Ltd. (Zurich, Switzerland)	Material and equipment supply including after-sales service, Specialized services.
Byron Jackson Inc. (Singapore)	Manufacturing, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
C. Itoh Energy Development Co. Ltd. (Tokyo, Japan)	Specialized services.
Cameron Iron Works Pty. Ltd. (Mordialloc, Victoria, Australia)	Material and equipment supply including after-sales service.
Cerf Oil Ltd. (Seychelle Islands)	Consultant.
Chaun Hup Marine Pty. Ltd. (Singapore)	Miscellaneous support services.
Chicago Bridge & Iron Co. (Oak Brook, Illinois, USA)	Fabrication, Construction.
Christensen Diamond Product (Private) Ltd. (Singapore)	Miscellaneous support services.
Coffey & Hollingsworth Pty. Ltd. (Brisbane, Queensland, Australia)	Consultant.
Cogera Nederland N.V. (Stryen, Netherlands)	Material and equipment supply including after-sales services, Miscellaneous support services.
Comco Services (Houston, Texas, USA)	Manufacturing, Material and equipment supply including after-sales services, Miscellaneous support services.
Comex (France) (Marseille, France)	Specialized services, Miscellaneous support services.
Compagnie Generale De Geophysique (CGG) (Massay, France)	Specialized services.
Consulting Inspection & Testing Services Pty. Ltd. (Singapore)	Consultant.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina—Continued

Company	Services
Construction Metallique De Provence. (Nevilly, France)	Fabrication, Construction, Manufacturing.
Core Laboratories Inc. (Dallas, Texas, USA)	Consultant, Material and equipment supply including after-sales service, Specialized services.
Creole Production Services International Inc. (Houston, Texas, USA)	Consultant, Material and equipment supply including after-sales service.
Crest Engineering Indonesia Inc. (Tulsa, Oklahoma, USA)	Construction, Consultant, Specialized services.
Cundill Meyers & Associates Pty. Ltd. (Upwey, Victoria, Australia)	Consultant.
Daelim Industrial Co. Ltd. (Seoul, Korea)	Construction.
Dames & Moore (North Sydney, New South Wales, Australia)	Consultant, Specialized services, Miscellaneous support services.
Daniel Mann Johnson & Mendenhal (Los Angeles, California, USA)	Construction, Consultant.
Decca Survey Australia Ltd. (Sydney NSW, Australia)	Specialized services.
Delta Exploration Co. Inc. (Houston, Texas, USA)	Consultant, Specialized services.
Digicon B.V. (Singapore)	Specialized services.
Dodsai GmbH (Kramat Lane, Singapore)	Construction.
Dolphin International SA (Singapore)	Specialized services.
Donald Gene Lamdford (Individual Consultant). (Jakarta)	Consultant.
Dowell Schlumberger (Eastern) Inc. (Paris, France)	Fabrication, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Dresser Minerals International (Dallas, Texas, USA)	Fabrication, Construction, Manufacturing, Consultant, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Drillco Division Smith International Inc. (Midland, Texas, USA)	Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
E.E. Black Ltd. (Honolulu, Hawaii, USA)	Construction, Manufacturing.
Eastern Sea Service (Ind) SA. (Republic of Panama)	Miscellaneous support services.
Eastman Whipstock Inc. (Lafayette, Louisiana, USA)	Specialized services.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina—Continued

Company	Services
Exploration Logging International Inc. (Singapore)	Consultant, Specialized services.
Far East Crane Rentals (H) Ltd. (Singapore)	Construction, Material and equipment supply, including after-sales service, Specialized services.
Federal Drillers Sendirian Berhad (Singapore)	Construction, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Field International Drilling Co. (San Antonio, Texas, USA)	Specialized services.
Fire Engineering & Hardware (Singapore)	Manufacturing, Consultant, Material and equipment supply including after-sales services.
Flopetrol S.A. (Paris, France)	Manufacturing Consultant, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Fluor East Asia, Inc. (Los Angeles, California, USA)	Fabrication, Construction, Consultant, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Fluor Eastern, Inc. (Los Angeles, California, USA)	Fabrication, Construction, Consultant, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Fluor Ocean Services International (Los Angeles, California, USA)	Construction, Specialized services, Miscellaneous support services.
Forex Neptune (Paris, France)	Specialized services.
Gafeney Cline & Associates Ltd. S.A. (Kause Byl Fleet, U.K.)	Consultant
General Electric Technical Services Co., Inc. (Bridgeport, Conn., USA)	Consultant
Geoasia Ltd. (Hong Kong)	Specialized services.
Geoco (Massay, France)	Specialized services.
Geodetic and Construction Survey Ltd. (Zug, Switzerland)	Consultant, Specialized services.
Geophysical Engineering Pty. Ltd. (Singapore)	Specialized services.
Geoservices Far East (Paris, France)	Specialized services.
Global Marine Drilling Co. (Los Angeles, California, USA)	Specialized services.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina—Continued

Company	Services
H.V. Engineering Pty. Ltd. (Singapore)	Consultant, Specialized services.
Halliburton Limited (London, England)	Material and equipment supply including after-sales services, Specialized services.
Hydrospace International (SE Asia Pty. Ltd.) (Dubai, United Arab Emirates)	Specialized services.
Hyundai Construction Co. Ltd. (Seoul, Korea)	Construction.
I.U.C. International Inc. (Panama, Panama)	Specialized services.
Incos Marine Ltd. (London, U.K.)	Consultant, Specialized services, Miscellaneous support services.
Indonesia International Inc. (Palo Alto, California, USA)	Consultant, Material and equipment supply including after-sales service, Miscellaneous support services.
Indonesia Surveys S.A. (Dallas, Texas, USA)	Specialized services.
Indwell Associates Ltd. (Hong Kong)	Construction, Consultant.
Inspection & Marketing service (HK) (Hong Kong)	Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Instube Ltd. (Beverly Hills, California, USA)	Material and equipment supply including after-sales service.
Inter Marine Services Ltd. (Singapore)	Material and equipment supply including after-sales service.
Ishikawajima Harima Heavy Industries Co. Ltd. (Tokyo, Japan)	Manufacturing.
Jack R Warren & Associates S.A. (Singapore)	Consultant.
Japan Drilling Co. Ltd. (Nishikobu, Japan)	Specialized services.
Japan Gasoline Co. Ltd. (Tokyo, Japan)	Construction.
Kanematsu Goshō Ltd. (Tokyo, Japan)	Construction, Material and equipment supply including after-sales service.
Kellogg Overseas Corp. (KOC) (Houston, Texas, USA)	Fabrication, Construction, Manufacturing, Consultant, Specialized services, Material and equipment supply including after-sales service, Miscellaneous support services.
Kenneth G. Parrent (Singapore)	Consultant.
Key International Drilling Co. Ltd. (Hamilton, Bermuda)	Specialized services.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina—Continued

Company	Services
King Wilkinson (Int.) N.V. (Den Haag, Netherlands)	Construction, Consultant, Specialized services, Miscellaneous support services.
Kipo, Inc. (Houston, Texas, USA)	Consultant, Specialized services.
Lawrence Allison & Associates Corp. (Houston, Texas, USA)	Consultant.
Liffey Marine Inc. (Singapore)	Consultant, Material and equipment supply including after-sales service, Miscellaneous support services.
Loe A. Daly Co. (Omaha, Nebraska, USA)	Consultant, Specialized services.
Loffland Brothers Co. (Fort Worth, Texas, USA)	Specialized services.
Lombardo Marine Group Pty. Ltd. (Perth, West Australia)	Miscellaneous support services.
Lor International Pty. (Singapore)	Material and equipment supply including after-sales service.
Lynes United Services Ltd. (Singapore)	Specialized services.
Mannesmann—Export A.G. (West Germany)	Consultant, Material and equipment supply including after-sales service.
Marine Chartes (S) Pty. Ltd. (Singapore)	Specialized services.
Marine Drilling Co. (Corpus Christi, Texas, USA)	Specialized services.
Marubeni Corp. (Tokyo, Japan)	Construction, Material and equipment supply including after-sales service.
McClelland Engineers Inc. (Houston, Texas, USA)	Consultant.
Menard South East Asia (Pte) Ltd. (Singapore)	Consultant, Specialized services.
Metlab Mapel Pty. Ltd. (Singapore)	Specialized services.
Mitsubishi Corp. (Tokyo, Japan)	Fabrication, Construction, Material and equipment supply including after-sales service.
Mitsui & Co. Ltd. (Tokyo, Japan)	Construction.
Niigata Engineering Co. Ltd. (Tokyo, Japan)	Fabrication, Construction, Manufacturing, Consultant, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Nippon Kokan Kabushiki Kaisha (Tokyo, Japan)	Fabrication, Construction, Consultant.
Nippon Marine Service Engineering Co. Ltd. (Tokyo, Japan)	Miscellaneous support services.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina—Continued

Company	Services
Nissho—Iwai Co. Ltd. (Tokyo, Japan)	Consultant, Material and equipment supply including after-sales service.
Ocean System Australiasia Pty. Ltd. (Singapore)	Specialized services.
Offshore Navigation Inc. (New Orleans, Louisiana, USA)	Specialized services.
Otis Engineering Corporation (Dallas, Texas, USA)	Material and equipment supply including after-sales service, miscellaneous support services.
Overseas Management Consultant Inc. (Hong Kong)	Consultant.
Overseas Technical Service International (Zurich, Switzerland)	Consultant, Specialized services, Miscellaneous support services.
Pacific Architects Engineering Inc./Resources Management International (Holding) Ltd. Joint Venture. (Los Angeles, California, USA)	Construction, Consultant, Material and equipment supply including after-sales service, Specialized services.
Pacific Bechtel Corp. (San Francisco, California, USA)	Fabrication, Construction, Consultant, Specialized services, Miscellaneous support services.
Pacific Logistic S.A. (Singapore)	Miscellaneous support services.
Pacific Procon Ltd. (Des Plaines, Illinois, USA)	Fabrication, Construction, Consultant, Specialized services, Miscellaneous support services.
Parker Drilling Co. of Indonesia Inc. (Tulsa, Oklahoma, USA)	Specialized services.
Peschaud & Co. (Paris, France)	Consultant, Specialized services, Miscellaneous support services.
Petroleum Consultant (Houma, Louisiana, USA)	Consultant, Specialized services.
Petroleum Inspection Service (Singapore)	Specialized services.
Petty Ray Geophysical Inc. (Singapore)	Specialized services.
Prakla Seismos GmbH (West Germany)	Material and equipment supply including after-sales service, Specialized services.
Price Construction (HK) Ltd. (Singapore)	Construction.
Quadra Engineering Ltd. (Calgary Alberta, Canada)	Construction, Consultant.
R. E. Hunter and Associates (Brisbane, Australia)	Consultant.
Reading & Bates Exploration C. Cabang Indonesia (Tulsa, Oklahoma, USA)	Specialized services, Miscellaneous support services.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina—Continued

Company	Services
Richter Drilling Pty. Ltd. (Brisbane, Australia)	Specialized support services.
Robertson Research (Llandudno, U.K.)	Consultant, Specialized services.
Robray Offshore Drilling Co. Ltd. (Hong Kong)	Specialized services.
Rowan International Inc. (Singapore)	Specialized services.
Salvesen Offshore Drilling Ltd. (Edinburgh, Scotland, U.K.)	Specialized services.
Santa Fe International Services Inc. (London, U.K.)	Specialized services.
Schlumberger Overseas SA. (Panama)	Specialized services.
Sea and Land Drilling Contractors Inc. (New York, USA)	Specialized services.
Seamar International (HK) Ltd. (Hong Kong)	Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Seapac Inc. (Seattle, Washington, USA)	Miscellaneous support services.
Seismic Navigation Service Ltd. (South Perth, Western Australia)	Consultant, Specialized services.
Seismograph Services Ltd. (Keston, Kent, England)	Specialized services.
Selco	Manufacturing, Material and equipment supply including after-sales service, Miscellaneous support services.
Select International Inc. (Singapore)	Material and equipment supply including after-sales service.
Siemens P.T. Indonesia	Consultant, Material and equipment supply including after-sales service.
Sime Darby Shipping Ltd. (Singapore)	Miscellaneous support services.
Smitlloyd N.V. (Rotterdam, Netherlands)	Miscellaneous support services.
Spencer & Partners (London, U.K.)	Consultant, Specialized services.
Straits Engineer (S) Pty. Ltd. (Singapore)	Construction, Consultant, Material and equipment supply including after-sales services.
Sumitomo Shoji Kaisha Ltd. (Tokyo, Japan)	Construction, Manufacturing, Material and equipment supply including after-sales service, Specialized services.
Sun Marine Drilling Coy Raymond International Joint Venture. (Los Angeles, California, USA)	Specialized services.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina—Continued

Company	Services
Taisei Corporation Co. Ltd. (Tokyo, Japan)	Fabrication, Construction, Manufacturing, Consultant, Material and equipment supply including after-sales services, Miscellaneous support services.
Teledyne Offshore Inc. (Singapore)	Construction, Specialized services.
Thurston & Associates Marine Consultant (Pty) Ltd. (Singapore)	Consultant, Miscellaneous support services.
Timber Transport (Singapore)	Miscellaneous support services.
Toa Harbor Work Co. Ltd. (Singapore)	Fabrication, Construction, Consultant, Material and equipment supply including after-sales service, Specialized services, Miscellaneous support services.
Tong Bros. Aluminum Coy Private Ltd. (Singapore)	Fabrication, Construction.
Toyo Kanetsu K-K. (Tokyo, Japan)	Fabrication, Construction.
Toyo Menka Kaisha (Isaka, Japan)	Fabrication, Construction, Manufacturing, Material and equipment supply including after-sales service, Miscellaneous support services.
Tran-Asia Singapore Private Ltd. (Singapore)	Construction.
United Casing Steel & Pipe (Hong Kong)	Material and equipment supply including after-sales service.
Universal Coaters (Singapore)	Construction.

Appendix 2.—Indonesia: Foreign Service Contractors to Pertamina—Continued

Company	Services
Varel Manufacturing Company (Dallas, Texas, USA)	Material and equipment supply including after-sales service.
Wallem Towage & Salvage Pty. Ltd. (Singapore)	Consultant Material and equipment supply including aftersales service, Specialized services, Miscellaneous support services.
Weather Ford Oil Tool Ltd. (Singapore)	Specialized services, Miscellaneous support services
Westburne International Drilling Ltd. (Hamilton, Bermuda)	Specialized services.
Western Geophysical Coy of America (Singapore)	Specialized services.
Western Offshore Drilling and Exploration Co. (Wodeco) (Singapore)	Material and equipment supply including after-sales services, Specialized services, Miscellaneous support services.
Whittaker Corp. (Los Angeles, California, USA)	Consultant
William Brothers Eng. Co. (Tulsa, Oklahoma, USA)	Consultant
X-Ray Engineering Co. (India) Private Ltd. (Bombay, India)	Consultant, Specialized services
Zapata Marine Service Ltd. (Houston, Texas, USA)	Miscellaneous support services.
Zapata North Sea Inc. (Houston, Texas, USA)	Specialized services.
Zublin, Ed AG & Grunbil- finger	Construction, Consultant.

Source: Exploration and Production Division, MIGAS.

Printing and Publishing

The early seventies saw the Indonesian printing industry enter an era of increased sophistication and technical expertise, and firms which took part in this trend are doing well and looking to expansion. Major expansion is expected in the fields of textbook production, printing for packaging, and business/commercial printing. Government emphasis on literacy, a doubling of school enrollment, an increase in per capita income, and an interest in packaging exports will contribute to this growth.

Total Indonesian imports of printing and publishing industry equipment are estimated to increase from \$8.5 million in 1975 to about \$20 million by 1980. The majority of equipment need is in the pre-press and package printing fields.

American equipment has an excellent reputation in the market for quality and dependability, but U.S. suppliers will have to face competition from the Germans and Japanese with financing, training, and pre- and after-sales services being heavily weighed in purchase decisions.

INDUSTRY STRUCTURE AND SIZE

The early seventies have been a period of steady growth in both quality and quantity, marred only by a production dip in 1973-74 caused by exceptionally high paper prices. In 1975, there were 165 daily newspapers with a total circulation of 1,870,000; 37% of this total circulation was accounted for by some half dozen major papers in Jakarta; 67,000 was on the remainder of the island of Java, while the remainder was on the Outer Islands. In addition, there were 1,114 weekly newspapers and 99 regularly published magazines. In the same year there were

more than 1,500 printing establishments listed by the Indonesian Central Bureau of Statistics. The volume of book publishing is expected to reach 3,000 new books per year with an average of 96 pages and 5,000 copies during 1976. Newsprint consumption in 1976 is placed at 44,000 tons (table 1).

The three major divisions in this industry are: (1) newspaper, periodical, and book printing (2) commercial and business printing (3) government printing. During 1976 there were about a dozen major printing and/or publishing companies, 60 to 100 medium-size printers, with the remainder being firms of small and limited output. Technical expertise varies widely with some of the leading firms working in a variety of printing and publishing activities (see table 2). A look at a representative number of major producers in these fields provides a picture of good management, knowledge of advanced printing technology, and confidence in future growth. However, smaller producers sometimes suffer from a lack of management and technological skills and a minimum of supportive infrastructure.

Newspaper, Periodical, and Book Printers

Gramedia Publications, acknowledged by many as the industry's leader, includes in its roster the printing of the leading circulation newspaper, Kompas, whose 200,000 daily copies make their way all over Indonesia. Founded in 1965 with a circulation of 15,000, the paper has grown from 4 pages to 16 with projections calling for a 24-page 1980 daily circulation of 400,000.

Originally printed on a contract basis, Kompas got its own production equipment including offset presses in 1972. During 1973, Kompas utilized only 60% of press capacity, but by 1975 total capacity was ex-

Table 1.—Indonesia: Newsprint Consumption
(In thousands kgs.)

	1970	1971	1972	1973	1974	1976	1980
Monthly Consumption for Dailies	1,179	1,360	1,941	2,431	2,363	3,230	4,606
Monthly Consumption for Magazines & Other Publications	415	384	500	787	748	994	1,422
Total Annual Consumption	19,144	20,931	29,309	38,630	37,339	44,707	62,342

Sources: Ministry of Information, trade source estimates interviews.

Table 2.—Indonesia: Principal Printing and Publishing Organizations (1976).

Firm	Location
Books and Periodicals	
P.T. Sinar Kasih	Jakarta
Gramedia Publications	Jakarta
P.T. Masa Merdeka	Jakarta
P.T. Gunung Agung	Jakarta
The Selecta Group	Jakarta
P.T. Wiwara Jaya	Jakarta
The Surabaya Post	Surabaya
Suara Merdeka	Semarang
Kedualantan Rakyat	Jogjakarta
Sinar Indonesia Baru	Medan
Waspada	Medan
Mimbar Umum	Medan
Pedoman Rakyat	Ujung Pandang
Pikiran Rakyat	Bandung
Commercial	
P.T. Dai Nippon	Jakarta
Victory Offset	Jakarta
P.T. Intermedia	Jakarta
N.V. Mei Hoa	Jakarta
P.T. Forinco	Jakarta
P.T. Jayakarta	Jakarta
AMCO Offset	Jakarta
C.V. Eastway International	Jakarta
Pusaka Raya	Jakarta
P.T. Panca Simpati	Jakarta
Gapura Grafika	Jakarta
Sastra Tjitra	Jakarta
Tjahaja Printing	Jakarta
Wahyu Adadi	Jakarta
Jakarta Printers	Jakarta
Jasanku	Jakarta
Trinity	Jakarta
Speedy Print	Jakarta
P.T. Guru	Kudus
Quick Firma	Jakarta
Government	
Department of Information	Jakarta
Directorate of Press and Graphic Guidance, Department of Information	Jakarta
LKBN "Antara"	Jakarta
Percetakan Negara, N.I.	Jakarta
Pusat Grafika Indonesia	Jakarta

Source: Trade source interviews.

ceeded and plant expansion was necessary. The expansion in 1976 involved the installation of an additional press line and the construction of a multi-storied administration building. Kompas is the only newspaper in the country to have a private telex system.

In addition to Kompas, Gramedia publishes two of the best selling magazines in Indonesia. Intisari, with a 1976 circulation of 150,000, is a "Reader's Digest" type of magazine written "for and about Indonesia." Bobo, a children's magazine with a combination of Dutch and locally written materials, also reaches 150,000 readers. In 1976, Gramedia obtained the Walt Disney franchise, and its material is now a regular feature in the magazine.

Gramedia's book division both publishes and prints a variety of materials including the extensive series, "Ceritera Dari Lima Benua" ("Stories from the Five Continents"). Gramedia has also applied for

textbook contract work under the Government's textbook project.

P.T. Sinar Kasih publishes the widely respected paper Sinar Harapan. Though second in circulation with over 150,000 copies Sinar Harapan ranks first in advertising volume. Started in 1961 with subcontracted printing and a circulation of 2,500, the newspaper presently uses two four-unit offset presses with a capacity of 36,000 impressions per hour and still subcontracts one-third of its printing volume. A Solna multicolor offset machine rounds out its press equipment.

In mid-1976, P.T. Sinar Kasih shifted to cold composition. It also has begun using computerized typesetting and has purchased a complete graphics section with nuArc cameras, cutting and stapling equipment for its bindery. The purchase of additional binding equipment for the plant is expected in the near future.

The firm also prints a women's magazine and does contract work for other firms. If it obtains the contracts now being negotiated, the firm also will print textbooks under the Government's textbook program.

Looking to circulation of 180,000 and a 24-page newspaper for 1980, P.T. Sinar Kasih planned plant expansion to begin in 1976. Suppliers of presses under serious consideration for the expansion were: Goss (USA); Harris (England); K & B (Germany); and Solna (Sweden).

To insure efficient delivery of the 60,000 newspapers that go outside Jakarta, P.T. Sinar Kasih developed a major transportation system, which has expanded into a growing delivery business.

Merdeka, one of the oldest privately owned publishers, has a magazine circulation of about 100,000. Begun in 1945 on presses obtained from the Japanese occupation forces, Merdeka had its own presses in 1950, and in 1967, caused a sensation in the local industry with the first privately owned offset press in Indonesia. Merdeka publishes the weekly news magazine Topic and the monthly magazine Keluarga. Having correctly judged the need of a newspaper for the expatriate community in Indonesia, Merdeka began publication of the English language Indonesian Observer in 1955, which now has a daily circulation of 12,000.

Other well-known newspapers in Jakarta include Berita Buana, subsidized by the Army and consistently number three in circulation, and Pos Kota, which is rising rapidly in Jakarta circulation through the extensive use of vivid pictorial coverage of local news, such as accidents. Another national English language newspaper, The Indonesia Times, is published by P.T. Wiwara Jaya in Jakarta.

Outside of Jakarta, the regional newspaper leaders are: The Surabaya Post in Surabaya, circulation 65,000; Suara Merdeka, in Semarang, circulation 20,000; Kedualatan Rakyat, in Jobakarta, circulation 25,000; Sinar Indonesia Baru, in Medan, circulation 15,000; Pedoman Rakyat, in Ujung Pandang, circulation 10,000; and Pikiran Rakyat, in Bandung, circulation 20,000, which enjoys a national circulation among people of Sudanese heritage.

Magazine quality has improved in the seventies with several very professional products on the market. The Selecta Group in Jakarta prints about seven magazines including Selecta and a variety of humor and fashion publications. High quality can also be seen in competing publications like Femina, the best seller for women, and Gadis, which is similar to Seventeen.

P.T. Gunung Agung is an important Jakarta publishing firm which is part of a group of related businesses, including a large book and office supply store, and several other businesses. The firm has been active in publishing the works of prominent Indonesian writers as well as textbooks. P.T. Gunung Agung's present plant consists of a medium-size printing press and several small offset units, but the firm is looking to future expansion.

Commercial and Business Printing

The latest advances in technology and printing science are utilized by the leaders in the field of commercial and business printing, which includes the rapidly growing package-printing industry. As late as 1971, no firm in Indonesia was equipped, either in machinery or technical ability, to do four-color work, but by 1975, several firms had obtained sophisticated equipment and were turning out excellent quality, four-color material.

P.T. Dainippon Gitakarya Printing, recognized by most as the pace-setters in excellence, utilizes both color offset and the newer rotogravure presses. It has three offset color lines and three rotogravure lines, one five-color and two six-color, which can also be used with five-color and a final lamination coating. The firm also has lamination coating, folding, gluing, and cutting equipment. This is an Indonesian-Japanese, joint-venture firm and uses equipment, supplies, and technical training personnel from Japan. With operations beginning in 1972, it had reached 80% capacity by 1976 and plans further expansion within the next 3 years.

P.T. Intermasa, a commercial printer, began multiple color work in 1970 and recently installed a fully automatic color scanner. Previous to this, some Indonesian businesses were using facilities in Singapore because all color presses in Indonesia were already being used at full capacity. Other leaders in color work include P.T. Forinco, Victory Offset, and P.T.

Guru in Jakarta, and Pusaka Raya in Kudus, East Java.

Government Printing

During 1976, the State printers, the State publishing company, and the State news agency were all making organizational changes for more effective usage of personnel and machinery.

Percetakan Negara N.I. (the state printing corporation) is reported to have one of the largest printing facilities in Southeast Asia and possessed a four-color press as early as the mid-fifties. It is officially responsible for the printing of all government documents, forms, and textbooks, and also prints the official daily State gazette, Tambahan Berita Negara. The equipment is rarely used to capacity, despite the fact that much of the textbook work is subcontracted to outside firms. Plans call for an increase in printing output with both equipment and organizational rehabilitation, including its separation as an independent agency from the Department of Information.

The State publishing company was organized in the late sixties, but has not yet operated effectively due to managerial problems and unclear objectives. In the mid-seventies, in cooperation with the Dutch, the management was being given intensive training in technology, publishing, and management, both locally and in Holland.

Lembaga Kabar Berita Nasional ("Antara"—the State news agency) is responsible for gathering and disseminating domestic and foreign news. It employs both correspondents and wire services. About 6,000 copies of its news bulletin are printed and delivered twice each week day, and one edition on Sunday. Antara uses both electric and hand mimeographing equipment. Computerized services are being integrated into its operations and the agency is looking forward to a 1977 move into its new 21-story office and communications center. Antara also publishes a business almanac. Plans for the future include further development of its extensive reporting and delivery network for production of a rural press tabloid or magazine.

Several other government departments have printing facilities. Money is printed at mint locations in Kebayoran. For security reasons, very little information is available as to equipment and personnel.

Pusat Grafika Indonesia (Indonesia's graphic training center) was established in 1969 by a special grant from the Netherlands. This institute for book and press development is working in a training and advisory capacity to develop an information infrastructure. The Center's well-equipped school trains students in every facet of printing and publishing. Its laboratory facilities serve the industry throughout the country.

Pusat Grafika Indonesia also prints and publishes the monthly magazine *Penyuluh Grafika*. The Center includes an overseas fellowship program and the assistance of Netherlands consultants. In addition, several companies, such as Mergenthaler Linotype and Solna, have dominated equipment for the center's use.

The original Netherlands grant of \$6 million included the establishment of university presses at Surabaya, Bandung, Jogjakarta, Semarang, and Ujung Pandung. In 1970, the Ford Foundation donated \$180,000 for establishment of a university press at the University of Indonesia in Jakarta. These university grant projects have not reached the level of development originally anticipated.

PRINCIPAL GOVERNMENT OFFICES

The Ministry of Information regulates the printing and publishing industries through the Departments of Information and Press. Much of the industry training is also provided by the Ministry.

Two other government offices are also influential in the industry. First, the Department of Education, through both the Director General of Primary and Secondary Education and the Textbook Project Officer, who decides on award of contracts for textbook printing, and second, the executive branch where decisions on paper import taxes, industry tax categories, and book transportation rates are made.

TRENDS, PROGRAMS, AND PROJECTS

Starting from a very limited base 15 years ago, the growth of printing and publishing in Indonesia has been solid and steady as verified by the more than doubling of newsprint consumption since 1970, the increased amount and value of recently purchased equipment, and the well-developed expansion plans. In 1973, a sharp rise in paper costs resulted in a corresponding drop in equipment purchases during 1974, but recovery was solid by 1975, and there is active preparation for the growth that many producers and suppliers feel is certain.

Major growth in the printing industry has been and will continue to be in the areas of offset printing and prepress skills. Equipment for layout and design, photographic composition, copy preparation, and process camera work are becoming increasingly important in all printing operations. The use of photographic methods has now been accepted and found time saving, as well as providing better quality and greater flexibility.

Another growing field is the preparation and printing of package materials. Since 1973, advanced printing technology has opened this field to rapid ex-

pansion, and the increasing demand for consumer goods should keep this market rising well into the next decade. Packaging materials are presently produced for domestic markets only, but printers are looking to entering export markets by 1979.

Education is a key focus of Government and general goals set under the First Five Year Plan, *Repelita I* 1969-70/1973-74) have been refined and intensified under the Second Five Year Plan (*Repelita II* 1974-75/1978-79). The decision to produce and distribute 179 million textbooks for primary education during the current Plan has already been initiated through the Third Education Project, a cooperative, equal-shares program of The World Bank, several Canadian paper mills, and the Indonesian Government. The initial agreement put a cost of \$13.5 million to each partner, but rising paper and printing costs have escalated the Government's portion to at least \$48 million. In early 1976, 3 to 4 million books had been printed and distributed under the project.

Another education—related development activity is through the Project *Inpres* program in which every school, both private and state, is scheduled to receive at least 100 new books for its library, as well as other Government allocations of materials for the secondary and university levels. Private foundations, world aid organizations, such as the United Nations (UNESCO), and foreign governmental agencies are considering various levels of support for these book and educational programs.

It is important to note, however, that original Government plans called for very large increases in both school buildings and textbooks before the 1976 financial crisis of the national petroleum corporation, forced budget cutbacks. Priorities are continually being reevaluated, and if reductions are made in school construction, textbook development programs will also be scaled down.

In 1976, the Board of Directors of *Ikatan Penerbit Indonesia (IKAPI)*, the National Publishers Association, met with the President to outline a three-point program for lowering the cost of books, including recommendations to:

1. Reclassify printing and publishing organizations as industrial enterprises instead of the present trading company status so that they qualify for the bank interest rate of 1% instead of 3%.
2. Lower the tax rate on imported book-quality paper (which has risen as high as 76% on some papers, while imported newsprint is tax free).
3. Establish a book rate for the domestic transportation of books. (Present delivery charges to some locations can double the cost of books, while newspapers and magazines already enjoy a lowered mailing rate.)

During his address to the Congress of Publishers' Convention in April of 1976, the President expressed support of the aims of these proposals. Their enactment, even in part, would greatly increase the momentum of book publishing and printing.

Another development project of the Indonesian Government is the Rural Press Program, considered a necessity in such a diverse and sprawling country. This project is directly in line with the adult education proposals of Repelita II, the current National Plan. A pilot project of the Rural Press Program was begun in the West Java Province in 1973. However, a recent public decree has banned the opening of new private newspapers until after the General Elections in 1977, and currently several private parties are planning on starting new newspapers as soon as the ban is lifted.

In addition to these major Government projects, a few printers such as Kompas and Sinar Harapan have expansion plans well underway, and others are contemplating equipment upgrading.

Between 1967 and 1976, there were nine approved foreign investments projects with total capitalization of \$7.9 million, all of which were approved prior to 1974. Cumulative approved domestic investment through 1973 totaled \$275 million. In 1974, approved domestic investments were \$7.1 million, and in 1975 \$11.8 million. These projects are in varied stages of implementation.

INDUSTRY GROWTH PROSPECTS

Prospects for growth of the printing and publishing industry are excellent. Projected expansion of the school system will keep school enrollment increasing faster than population growth for almost two decades, and if planned production of textbooks is fully realized, it will cause a 400% increase in textbook output during Repelita II.

With one plant producing monthly totals of 25 million "Lux" soap labels and 25 to 30 million of a single brand of cigarette packages, industry managers are looking forward to package exports in the next 2 to 3 years.

One indicator of the magnitude of printing industry potential is a comparison of 1975 per capita paper consumption figures. In the United States, per capita paper use was 170 kilograms, while Indonesian per capita consumption was only 1.5 kilograms. A comparison of paper consumption projections by industry specialists with population figures shows that the Indonesian figure should rise to more than 55 kilograms per capita in 1980, primarily through increased production of reading matter, packaging materials, business forms, and printed advertising.

Domestic paper production will not reach projected needs by 1980 and the industry will continue to rely on imported paper for the majority of its needs for the foreseeable future. The cost and availability of paper could serve as a damper on industry growth during the period.

The next few years should see industry leaders continue to invest in equipment that increases their technical capabilities. Increasing competition for equipment sales is beginning to result in better credit terms, which will allow the more solid and reputable firms to purchase equipment for participation in the growing market for quality printed materials. The remaining firms will continue as basic printers and small jobbers or go out of business.

MARKET SIZE

The total market in 1975 for printing and publishing equipment was an estimated \$8.5 million, a 34% recovery from the 1974 figure of \$6.3 million. Another 43% increase was projected for 1976 (table 3). These large increases are a result of: (1) the intensification of the massive Third Education Project textbook campaign, with printers upgrading their facilities in order to qualify for contracts under the program, and (2) the large expansion programs initiated by the two leading newspaper publishers. Based on evaluation of historical trends, development plans, and interviews with knowledgeable trade sources, it is estimated that in the remaining years of the current 5-year plan, an annual market growth in excess of 18% should be reached with the total annual market approaching \$20 million by 1980.

In 1974, sales of prepress and pressroom equipment declined as a result of the substantial 1973 worldwide increase in paper costs; however, purchases of bindery and finishing equipment increased more than three times as printers purchased equipment in order to qualify for certification as textbook printers under the Third Education Project, discussed previously. For example, of the 1975 total sales of \$8.5 million, 78% was pressroom equipment, 11% was in prepress items, and 11% in bindery and finishing equipment. During the remainder of the Repelita II period, it is expected that prepress equipment sales will be active during the first part of the period with sales of bindery equipment increasing nearer to 1980.

The current transition to offset printing in Indonesia resulted in increased press sales with several companies still considering purchases of various sizes. However, increased efficiency in press production scheduling could begin to release additional time on existing and newly purchased equipment. In the area of pressroom equipment, letterpress sales

Table 3.—Indonesia: Size of Market for Printing and Publishing Equipment

(in thousands of U.S. dollars)

	1973	1974	1975	1976	1980
Pre-Press Equipment					
Imports					
United States	257	190	347	428	700
United Kingdom	220	200	249	—	—
Netherlands	160	110	130	—	—
West Germany	66	50	76	—	—
Japan	120	160	98	—	—
Belgium/Luxembourg ..	27	25	30	—	—
Other	10	5	20	—	—
Total	860	740	950	1,200	2,200
Pressroom Equipment ²					
Local Production	1	1	1	1	1
Imports					
United States	521	300	1,300	1,800	920
West Germany	3,262	2,500	3,500	—	—
Japan	891	930	750	—	—
United Kingdom	283	600	600	—	—
Netherlands	76	550	250	—	—
Sweden	1	60	50	—	—
Others	153	40	250	—	—
Total	5,187	4,980	6,700	9,700	15,400
Bindery and Finishing Equipment					
Imports					
United States	14	84	100	160	390
West Germany	53	121	129	—	—
Japan	15	289	330	—	—
Switzerland	17	28	55	—	—
United Kingdom	18	100	190	—	—
Italy	10	27	25	—	—
Others	23	21	75	—	—
Total	150	670	900	1,320	2,330
Total Market Size	6,197	6,390	8,550	12,220	19,930

¹ Negligible.

² Figures in this table have been adjusted to exclude electrostatic copying machines and office duplicating equipment reported in official Indonesian statistics as printing equipment, and may differ considerably from that source.

Source: Official Indonesian and supplier statistics, estimates based on trade source interviews.

have averaged approximately 65 units per year while offset machines sales have been at about 144 units per year, including 100 units of small offset presses, 40 units of medium-size machines priced from \$8,000 to \$20,000, and four units of large machines valued at \$40,000 and up.

In Jakarta there is a growing market trend toward improved graphics equipment and other prepress capabilities as firms work to keep abreast of competition. Outside Jakarta, several firms often share the services of one graphics shop and this practice will continue until heavier production demands and available credit make individual ownership of such equipment both necessary and possible. Many regional printers are now deciding whether to delay the purchase of prepress equipment until their production requires it, or to buy in advance of full need in order to take advantage of this rapidly growing field by their ability to offer additional services. Marketing experts say that in prepress equipment approximately 30 typesetting machines will be sold each year

while about 20 to 30 units of platemaking and related equipment will be purchased.

Annual sales of binding equipment, including stitchers, staplers, trimmers, and cutters, are estimated to be 25 units each of stitchers and staplers, and about 20 units of mechanical trimmers and cutters.

Imports

All machinery, plates, supplies, and spare parts, 80% of newsprint, and all fine quality papers are imported. Major sources of printing machinery are the United Kingdom, Germany, Japan, and the United States. U.S. suppliers dominate the prepress field, West German firms lead in the supply of pressroom facilities, while Japan and the United Kingdom are leading sources for binding and finishing equipment.

The major suppliers of prepress equipment are firms from the United States and the United Kingdom, with 36% and 26% shares, respectively in 1975. By 1980, it is expected that the market shares of both the United States and the United Kingdom for prepress equipment will decline slightly as a result of increased competition from manufacturers in Japan and West Germany.

West German suppliers had 52% of the pressroom equipment market in 1975, while suppliers from the United States had 19%. By 1980, it is expected that German suppliers will increase this market share primarily at the expense of U.S. firms. It should also be noted that unless the current trend is altered, perhaps by more competitive financing, Japanese and U.K. sales will surpass American, and the U.S. market share could drop as low as 6% by 1980.

At the present time, Japanese manufacturers are the leading suppliers in the field of finishing and binding equipment with 37% of the market; British suppliers are also important sources of such equipment, providing 21% of the market in 1975. By 1980, it is expected that there will be an increase in sales by United States and German suppliers as a result of their ability to provide the quality equipment needed by the rising packaging industry and as Indonesia modernizes the present labor-intensive section of printing lines.

The major suppliers in the printing paper field are from New Zealand, Scandinavia, Finland, the United States, and Canada. Paper imports will be significant for at least a decade, as increased domestic production, even by the most optimistic estimates, will not fulfill market needs by 1980.

Ninety percent of Indonesia's requirements for English language books is met by imports, mainly from the United Kingdom, the United States, or Singapore. Imported books are usually the more expensive, hard cover variety, and include a full range of

titles from children's books through instructional and technical materials, as well as the latest paperback best sellers. Government requirements for local production of Indonesian language materials will result in near full utilization of domestic capacity and keep English language books as an import item for several years.

Domestic Manufacturing

Small platen letterpress equipment is manufactured in Solo and Bandung in sufficient quantity to meet the needs of the rural press for machines that are inexpensive and, more importantly, do not require electric power. There are no plans at present to undertake domestic production of modern printing and related equipment.

Though some binding equipment is domestically produced, it is mainly for soft-cover, glued and stapled or stitched materials. Hard-cover books, when produced, are usually for special edition presentations.

Indonesian language books and magazines are all domestically produced as it is illegal to import materials in the national language. Printing paper produced locally is primarily newsprint and other coarse types. Domestic gloss paper production is scheduled to begin by 1977, but trade sources question availability of the technical expertise necessary to match imported quality. For further information on this subject, see the "pulp and paper" report of this survey.

MARKET OPPORTUNITIES

Package printing is currently the fastest growing printing field in Indonesia and equipment geared to this production should find excellent markets in the next few years. The demand for offset and prepress equipment should also continue to provide a steady market as both volume and quality demands increase. Though there is still considerable unused capacity available, the use of offset equipment will spread, as the electrical power system is expanded throughout Indonesia well beyond 1980. In the prepress field, the increased use of graphics holds considerable market attention along with sophisticated word-processing procedures and although cold type and photo composition methods are attracting interest, technical difficulties experienced in the past are causing a certain amount of caution.

The rapid growth in textbook production will open the market to binding and finishing machinery. Gluing and stitching or stapling machines will continue to attract the greatest interest as the per capita income of the nation will not provide a viable market for hard-cover publications for some time.

Sizable sales of folding and collating equipment will remain some years in the future as firms continue to focus their investment funds on technical improvements in the composing room and pressroom, while retaining more labor-intensive methods in the bindery and distribution phases.

Support fields affording growth potential are:

1. Computerized information storage and retrieval systems to assist in printing up-to-date publications in this rapidly changing nation. Computer systems would expand printing fields, such as telephone books, business directories, and addressing and mailing services.

2. Materials handling equipment, such as small forklift trucks for moving rolls of newsprint. These are presently in limited use in some of the larger plants where only one covers the entire operation. The current practice of utilizing labor where possible will postpone such purchases, but demand for increased production time efficiency is growing and will necessitate this type of purchase by the late 70's.

3. Shipping room equipment, such as wrapping and tying machines. This equipment is now primarily considered to be delayed-purchase items, but the growing necessity to transport finished products in undamaged condition has resulted in some initial sales.

One factor that could affect future press sales is the fact that the UNESCO Third Education Project supplies cut paper rather than rolls. Originally intended to give more printers a chance to be eligible to compete in textbook bidding, this decision is now blocking the participation of the largest printing firms. While the large commercial printers say that with their web-fed equipment, they could produce at a lower cost per unit, this policy is expected to remain in effect until at least 1978. In order to be qualified to bid on these project contracts, a printer must have:

- 1 platemaker
- 2 sheet-fed offset presses (43×62)
- 1 binding machine
- 1 folding machine
- 1 trimmer
- minimum printing capacity: 300,000 books per 100 days, adequate storage capacity for paper and finished products.

In 1976, there were 76 qualified printers, an increase of 30% over the previous year. At least 25% of those qualified are located outside of Jakarta. Additional printers may attempt to procure equipment to qualify for participation.

The Government's Regional Rural Press program, mentioned earlier, also specifies a sample equipment "package" for eligible participants, as follows:

- 1 IBM Typewriter, selectric
- 1 Varityper

- 1 Polaroid instamatic camera
- 1 Itek platemaker
- 1 sheet-fed offset press
- 1 folding machine
- 1 cutting machine

Estimated cost for the sample "package" is \$32,500. There are about 100 provincial newspapers envisioned in the plan. In many areas, this would also necessitate supplementary equipment, such as small power generators and communication and delivery systems. This program may provide opportunities for "package" equipment sales.

There is open acknowledgement in the industry of the need for improvement in the field of management skills. The very top level people express frustration at having no supervisory level to provide real assistance and direction in their operations. Management is eager for arrangements that involve the exchange of executive and organizational skills, such as production scheduling and improved use of equipment capabilities.

Improvement is also needed in marketing techniques and distribution. The dilemmas of delivery are monumental, and lack of well-trained technical personnel is sometimes the reason for hesitancy in equipment purchases.

IMPORT PROCUREMENT

Buyers Universe

There are two principal buyer groups in this industry, private firms and Government departments, with private business being by far the larger market segment and the more advanced in printing capability.

Private Businesses.—The vast majority of private printing and publishing firms are still in the hands of, and run directly by, their owner/founders. In some cases there has been an expansion at the executive level to include a publisher and a manager as separate functions, but, even in these instances, major decisions are pretty solidly a "one-man show." While none of the firms have in-house consultants, the larger firms have sought outside advice when major long-range projects were under consideration.

There are four district groupings in the private printing sector:

1. First, there is a handful of highly skilled, advance-technology-oriented, and well-managed firms. This group is characterized by the latest in equipment, solid marketing techniques, expansion plans, and the continuous training of staff. They include newspapers, publishers, and commercial printers, the majority of which are located in Jakarta.
2. The second group, another 60 to 100 firms, have good business foundations and solid printing

expertise, at least to the limits of the older but dependable machinery with which they work. This group aspires to expansion and capital investment improvements, which would require replacing entire lines or sections. The scope of the necessary upgrading is beyond the financial resources presently available to them. Companies in this range form numerically the larger part of the Jakarta printing population, but many are located throughout Indonesia.

3. Antique hunters or printing museums would consider the third group a gold mine of printing history. Scattered throughout the archipelago are machines kept running only by the ingenuity and tender care of their owners. In areas without electricity, single sheet, hand-fed instruments still turn out the news. Also in this group, which numbers in the middle hundreds, are many single press, independent jobbers.

4. The last group, though calling themselves "Per-cetakan" (Printers), is more properly discussed in the sector, "Business Equipment and Machines." Numbering in the thousands and utilizing every type and vintage of copying machine, they presently play an important role in the commercial part of the industry.

Government Departments.—Each government office tends to do its own purchasing and is fairly protective of that position. While the details may vary slightly between departments, the general procedure involves the potential user presenting a fiscal proposal for equipment needs based on long-range projections. Actual expenditures, however, are done through the departmental purchasing office.

Foreign Suppliers Universe

The printing industry is supplied in Indonesia almost entirely by a few well-recognized international firms. Facing no competition from domestic production and providing reliable equipment, they have established themselves solidly in Indonesia. Most equipment is supplied directly from Japan, Europe, or the United States, with some of the multinational U.S. firms shipping from European subsidiaries for selected equipment types. There are also several smaller manufacturers who deal in single lines of equipment.

U.S. firms such as nuArc and Photon (Dymo) lead in the prepress field. Mergenthaler-Linotype has conducted a fairly intensive advertising campaign in trade magazines for the Linocomp machine.

Major suppliers of press equipment have been well-known companies, such as Heidelberg of Germany, and L.M. Pacer of England, which is expected to be a frequent seller for reasons of cost and reliability, and Goss from the United States, which is con-

sidered when high capacity and technical excellence are the major requirements.

Japanese equipment and Autominabinda of England do well in bindery items, though Wholenberg from Germany is strong in precision cutters. The packaging industry is still new enough that a strong preference has not yet emerged and, though the Japanese machinery is establishing a good reputation, no single line has cornered the market.

German firms have been successful in increasing sales by offering competitive financing, in spite of the relatively high initial cost of the equipment. Japanese suppliers continue to record significant sales as a result of aggressive salesmanship and attractive financing, although industry sources stated that many users have been disappointed with Japanese after-sales service. German firms have strengthened their position by supplying technical assistance in Indonesia for operators and maintenance crews and by making provisions for training Indonesians in Germany as well as at the Goethe Institute in Singapore. A Japanese strong point appears to be the ability and willingness to train Indonesians for supervisory plant positions. Several other suppliers, such as Solna and Mergenthaler-Linotype, have made low or no-cost equipment available to Indonesian training projects.

As the Indonesian printing industry grows, supply will become more competitive. Companies that have enjoyed reputations of reliability for years can no longer expect automatic sales to previous customers. There is already more comparison shopping and with many quality machines on the market, additional factors, such as financing, delivery time, followup service, training, and availability of parts, will begin to determine successful sales.

Marketing Factors

Most suppliers of printing equipment in Indonesia operate through an agent. About one-half of the leading manufacturers use an exclusive agent, while the remainder are listed with more than one. There were about 16 agents listed as handling printing equipment in mid-1976. There is, however, considerable variation in agent-principal relations in the printing equipment supply field. Some manufacturers have regularly sold directly to users, while others have bypassed appointed agents and dealt with customers either on their own initiative or in response to direct customer inquiries. This had led to misunderstandings and there appears need for more clear agreement as to the mutual obligations of principals and agents.

Supplier firms with a resident representative have a distinct advantage as customers feel that there is a better possibility of followup activities in both service and training assistance. This advantage will grow as competition for sales increases and customers feel

they have more leverage in obtaining postsales assistance.

Potential buyers emphasize two prime considerations: the technical capabilities of the equipment and the cost/credit arrangements for the sale. Terms of sale vary considerably. For example, one proposal for a recent large purchase was 10% on signing, 10% on shipment, and 80% in 10 equal payments; another offer was 5% on signing, 5% in 60 days, 5% on shipment, and 85% over 5 years at 9% interest. One of these proposals does not require an offshore bank guarantee according to Indonesian trade sources. European and Japanese firms offer consistently better financial terms than American firms.

Service and the availability of spare parts are also frequently mentioned as considerations in purchase decisions. Indonesian printers normally keep as extensive a stockpile of parts as can be afforded because, as one said, gesturing at an inactive machine, "We did not have the part we needed so we are losing about 6 weeks of machine time waiting for the replacement." Most printers cannot afford to tie up capital in large parts supplies and a manufacturer who maintains a local stock of parts will have a strong selling point.

Long delivery times have also influenced purchasing decisions. One firm was interested in a larger model Goss press, but bought the smaller Urbanite model because the delivery time was too long on the larger machine. Standardization of paper was also a consideration in this case, however, as the larger machine required a slightly smaller size paper than their existing press line and the firm did not want to stock two sizes.

Major factors in successful printing equipment sales in Indonesia as elsewhere appear to be exposure, persistence, and a willingness and ability to fulfill the real needs of the client. One agent, who recently closed a \$2,000,000 cash sale of printing equipment, told of knowing that the buyer would have to expand soon and said he had been calling on the firm for 5 years just to be there when they were ready. Another successful supplier also spoke of actively promoting his products by calling on potential customers regularly. Several customers expressed appreciation of the dealer who treats moderate accounts with the same consideration, planning, and follow-through as a major project. One agent, for example, who represents several firms from the United States and other countries, said he was developing package proposals which include one to four press units, as well as basic photographic and phototypesetting equipment.

There is a definite interest in new products. Potential Indonesian buyers spoke of difficulties in buying printing equipment from catalogs and sending people overseas to see equipment and discuss purchases. As

one printer expressed it, "We want to talk to the man who has been using a machine and find out what kind of problems he has been having." Many printers mentioned trade events that they had attended in Europe and the United States, such as the Graphic Arts Exposition in Chicago, and felt that a locally held event would be well received. Members of both IKAPI (The Indonesian Book Publishers Association) and Persatuan Perusahaan Grafika Indonesia (PPGI—The Indonesian Association of Graphic Industry) recommended a joint (local-foreign) project, with local associations cooperating in the organizational aspects.

Conventions and promotional events were also mentioned as providing the opportunity for new exposure and business contacts. For example, during National Press Week, sponsored by the powerful Serikat Penerbit Surat Kabar (SPS—Indonesian Newspaper Publishers Association) representatives from Southeast Asian nations will be present. Other professional organizations operating in this field include Serikat Garafika Press (SPG, The Graphic Press Association), PPP (the Union of Business Printers), and PWI (The Indonesian Journalists Association).

COMPETITIVE POSITION OF U.S. SUPPLIERS

"Quality" is the word most often repeated in any discussion of American printing and graphic arts equipment, and a solid reputation for dependability puts it in consideration for most projects. Indonesian buyers report that U.S. prices have not been competitive in the past, but that by 1975/76, the gap was closing. Although technical excellence is often listed as a major asset of American products, management of a few companies mentioned that technical operating requirements of U.S. equipment were sometimes beyond the abilities of Indonesian operators. One printing plant owner cited drying equipment that he never could get to work right and another, a composing machine that was constantly in need of repair. Both printers felt that the U.S. supplier's training and after-sale followup that went with the machine purchase had not been adequate. They noted that suppliers have to remember when training people in Indonesia that they are starting from a different level than in the West.

In order to maintain a competitive position, American suppliers must plan in terms of in-depth training

programs, both in operation and maintenance. As in most industries, financing and credit arrangements will continue to play an important role in printing equipment purchases. American suppliers must develop the capability to identify credit-worthy buyers and provide competitive financing to remain in this market.

The development of effective sales representation is also essential in the Indonesian market, and a relationship based on cooperation and mutual respect is required. One Indonesian representative characterized a successful arrangement with his principal, "I need his technical, managerial, and marketing skills, and he needs my knowledge of the Indonesian situation. We both know we could not make it alone."

By all indications, the Indonesian printing and publishing industries will continue to grow and American technical and management expertise should enable expansion of the U.S. suppliers market position. Four major focuses for marketing should be:

- 1. Selection of resident representative:** The representative should be competent to serve in a combination consultant/service role, advising on printing needs and assisting in the building and implementation of step-by-step long-range development and expansion programs. The representative should be able to back-up sales with service and parts.

- 2. Development of proposals directed at participation in special projects:** One possibility would be to work with the middle-size printing establishments to upgrade their equipment to qualify for Third Education Project contracts. These proposals would be most effective if made as entire system or as "package" proposals with optional features. The same technique could also be used with the rural press expansion.

- 3. Development promotional activities:** Promotional activities will be better attended if held in connection with a local industry event, such as the National Press Week or SPG Convention, discussed previously, and more solidly supported, if co-sponsored and coordinated with an Indonesian professional association.

- 4. Provision of management and marketing counseling.**—In addition to providing technical assistance in the selection and installation of equipment, training of operators and maintenance, sales proposals might also include management assistance in such areas as production scheduling and organization of work, and marketing methods.

Telecommunications

Indonesia's telecommunications system has experienced dramatic growth. With the installation of the country's own domestic communications satellite in 1976, the possibilities for continued growth and development were enhanced. Market potential for all types of telecommunications and ancillary equipment is high. Good opportunities exist for consulting and technical assistance services.

The State Telecommunications Corporation (Perumtel) provides most of the telecommunications services in Indonesia. There are a number of private telecommunications systems, and some large firms have their own networks to reach remote locations and to meet other needs not filled by Perumtel.

During the Second Five-year Development Plan (Repelita II, 1974-75/1978-79), Perumtel plans to increase the number of available telephone line units by nearly 400,000. The estimated cost is \$430 million. The total market for communications equipment is expected to increase from \$154 million in 1975 to \$365 million in 1980. Consumer radio and television sales will be the largest segment of the market, with telephone, telegraph, and radio telecommunications equipment also showing significant growth.

SYSTEM STRUCTURE AND SIZE

Common Carrier Communications

Common carrier communications in Indonesia are the basic responsibility of Perusahaan Umum Telekomunikasi (Perumtel, Public Telecommunications Corporation), a government-owned corporation under the general direction of the Department of Communications.

Perumtel has about 21,500 employees throughout the country.

The firm operated a total of 544 telephone exchanges in 1975 of which 465 were local, manual battery operated, 42 were central, manual battery operated, and 37 were automatic exchanges. The firm has about 280,000 subscribers. Total revenues have grown dramatically. They increased more than four times from \$14.4 million in 1969 to \$66.6 mil-

lion in 1974. Estimates place 1975 revenues at over \$87 million. Income is expected to reach \$215 million by 1980. Sources of Perumtel's revenues in 1974 were as follows:

<i>Type of communication</i>	<i>\$ Million</i>
Overseas telephone calls (outgoing)	7.7
Automatic trunk call exchanges	16.7
Manual trunk call exchanges	10.7
Automatic local exchanges	13.7
Domestic telex	.5
Overseas telex	10.2
Domestic telegrams	2.4
Overseas telegrams	4.7
Total	66.6

Local battery exchanges used are Swedish Ericsson ABH (up to 50 line units) and ABK (with a capacity of 200 line units). Some old Kellogg exchanges, which do not differ appreciably from the modern types, are still used. The central exchanges use a common rectified power supply located in the telephone office for both exchange and subscriber equipment. Ericsson ADK 513 exchanges with a capacity of up to 1,120 line units are currently used by Perumtel. Some pre-World War II L.M. Ericsson and Siemens equipment is also in use.

Automatic exchanges currently use electromagnetic relays and mechanical contact switches. Two kinds of electromagnetic exchange equipment are used: step-by-step and common control. Three makes of automatic exchanges are currently used: Siemens of Germany, Philips of Holland, and L.M. Ericsson of Sweden. Exchange line capacity (not including PABX) in 1974-75 (the latest year for which data are available) was as follows: automatic type, 163,060 line units; manual type, 90,320 line units.

Perumtel also utilizes carrier telegraph and telephone equipment for AM systems, FM systems, and single and double-tone systems. Automatic request control equipment is used in conjunction with radio bearers to provide domestic point-to-point services, leased channels, and domestic telex between Jakarta and Medan.

Transmission equipment used includes open wire carrier systems, HF radio, VHF radio, microwave,

and satellite. The open-wire carrier systems operate on 3-mm to 4-mm copper or copper weld open wire circuits and are mostly of 3- or 12-channel capacity. The main brands used are Standard Electric Lorenz, L.M. Ericsson, Siemens, and Nippon Electric.

HF radio is used extensively for interisland and international communications. Independent wide-band, single sideband and double sideband modes are also used.

Total circuits in operation by Perumtel as of 1975 were as follows:

Type	Use	Capacity
HF radio	Domestic radiotelephone	196 channels
	Domestic radiotelegraph	251 channels
	Overseas radiotelephone	4 channels
	Overseas radiotelegraph	6 channels
Open wire carrier	Domestic telecommunication	28,039 channel km
Microwave	Domestic telecommunication	72,363 channel km
VHF/UHF	Domestic telecommunication	4,822 channel km

At the end of 1975, 592 telegraph offices were in operation. Included were 30 main telegraph offices, 11 branch offices in major cities, 498 branch offices in small towns, 49 branch offices operating with telephone exchange offices, and four branches in post offices.

Telex facilities include one overseas telex central, 18 domestic telex centrals, 16 branch offices, 39 domestic teleprinter leased channels, and 34 overseas teleprinter leased channels. Demand for services generally surpasses supply.

Perumtel's microwave network forms a key part of its telecommunications system. During the First National Development Plan, the Java-Bali Microwave Network, the backbone of the entire system, was completed. In Sumatra, the Trans-Sumatra Microwave System connects Medan in the North of Sumatra with Telukbetung in the south. The Trans-Sumatra Microwave Network is linked with the Java-Bali Microwave Network between Telukbetung in Southern Sumatra and Jakarta. The Surabaya-Banjarmasin Troposcatter Link connects Surabaya on Java with Banjarmasin on Kalimantan. The Troposcatter Link is used because the long distance between Java and Kalimantan makes microwave transmission impossible. The Kalimantan Link is subconnected with the two local microwave networks on Kalimantan.

For international connections, Perumtel inaugurated its first satellite Earth Station in 1969 at Jatiluhur, near Jakarta. It uses the Indian Ocean Intelsat. These facilities were augmented in 1976 with the country's own satellite and additional ground stations. The international satellite link is operated by

P.T. Indonesian Satellite Corporation, a joint venture between Perumtel and the U.S. based multinational, ITT.

Perumtel expansion plans.—The Indonesian Government plans a rapid expansion of landline facilities, including a large development of the telephone system, during the current national plan. By 1979 projections call for 394,200 line units to be added to Perumtel's system at a cost of approximately \$430 million, in accordance with the following schedule.

Fiscal Year	Number of Units
1974/75	38,600
1975/76	66,400
1976/77	89,800
1977/78	92,000
1978/79	107,400

The distribution of the line units at 139 locations will be as follows.

Territory	Percent of line units	Number of locations
Jakarta	49	27
Central Java	7	16
East Java	12	23
South Sumatra	2	5
Central Sumatra	2	7
North Sumatra	10	20
Sulawesi	2	5
West Java	8	16
Kalimantan	3	6
Bali and Nusatenggara ...	2	5
Maluku	1	2
Irian Jaya	2	6

Expansion of telegraph and telex capacity is also slated during the current plan period from 15 exchanges with a capacity of 1,810 line units to 27 exchanges with a capacity of 12,950 line units.

In 1975 and 1976, initial contracts were let for expansion of the telephone system. A contract for \$130 million was awarded to the Bell Telephone Manufacturing Company of Belgium (an ITT subsidiary) to supply and install 102,500 line units for local and trunk exchanges. Of that total, 58,000 will use the electronic Metaconta system while 44,500 will use the electromechanical Pentaconta system.

Siemens of Germany was contracted to install 96,000 electromechanical line units in Java and Bali. British Insulated Callender's Cables (BICC) of the United Kingdom was contracted to supply and install cable facilities outside Java and to install telex and telephone exchanges on Java and Bali. Philips and Netherland Kabel Fabriek (NKF) of the Netherlands were awarded a \$234-million contract

for expansion of the Jakarta telephone system with 158,500 new electronic line units.

The Medan-Banda Aceh Microwave Link, the Eastern Microwave System (connecting Bali with Mataram, Ruteng, and Maliki), and the Padang-Pakanbaru-Tanjungpinang Microwave links are scheduled for completion during the current national plan. After completion of those links microwave spur routes will be installed. No significant microwave procurements are anticipated during the current national plan after these programs are completed.

Domestic communications satellite.—A major development for Indonesia was the decision to build a domestic communications satellite system. Although the program was not initially in Repelita II, a decision was made during 1975 to purchase and install the system before the end of the plan. The first satellite named "Palapa," an Indonesian symbol of unity, was successfully launched in July 1976 from the U.S. Space Center in Florida. With this satellite, Indonesia joined the very small group of countries (including the United States, Canada, and the Soviet Union) possessing such a domestic system.

In 1975, the domestic satellite communications system contracts were signed. An agreement for the launching of the communications satellites was signed by the Director-General of Post and Telecommunications and the U.S. National Aeronautics and Space Administration (NASA) in early 1975. Financing for part of the project came from the Export-Import Bank of the United States (U.S. Ex-Im Bank) and a Bank of America-led consortium; the Indonesian Government financed the remainder. The U.S. Ex-Im Bank credits were used to cover contracts with Hughes Aircraft Company, Aeronautics-Ford, and Federal Electric International, the ITT subsidiary.

Indonesia purchased two Hughes Aircraft HS 333D satellites, the same as those used for the Canadian domestic satellite system. Delta 2914 launch vehicles were purchased, including one spare in case of failure. The ground system will include 40 Earth stations and 34 VHF and TV rebroadcast transmitters. At the time of the satellite launching, 28 of the total 40 stations had been completed. Earth stations will include one master control station, 18 main traffic stations, 15 light traffic stations with TV transmission, and six light traffic stations without TV transmission.

Each master control station includes a 32-foot antenna with a 6-kW transmitter for telemetry, tracking, and command, and a 32-foot antenna with a 3-kW transmitter for communications, including 600 telephone circuits and one color TV transmitter channel. The main traffic stations included a 24-

foot antenna and a 100-W transmitter with two to 15 telephone circuits and color TV receiving capability. The light traffic stations have a 24-foot antenna and a 100-W transmitter for two to six telephone circuits and a color TV receiving channel.

Total cost of the system, including foreign exchange and local currency will be \$255 million. The cost of the satellite and its launching is \$153 million and \$102 million will be spent to establish Earth stations and other facilities in various areas of the country. Specific plans for additional funding have not been made, but knowledgeable trade sources estimate that annual equipment expenditures of over \$10 million could be made for the satellite system.

The introduction of the system will result in substantial opportunities for the sale of additional equipment. While satellite systems are ideal for areas with difficult geography, such disadvantages as the higher cost per circuit relative to terrestrial communications systems, and the quarter-second transmission delay in telephone applications are drawbacks. It is estimated that even by 1986, only about 20% of trunk calls will be by satellite.

Although Perumtel will be the operator and major user for the satellite system's common carrier operations, government agencies such as the Defense and Education Departments will also make use of it.

Other Telecommunications Systems

Perumtel cannot keep up with the increasing demand for telecommunications services, and temporary concessions have been issued to various private and governmental agencies to operate their own networks. Among the 7,000 radio stations operating in 1975 under concessions, 3,061 belonged to P.N. Pertamina, the national petroleum corporation, while the remainder belonged to various private and government organizations including:

- Interior Department
- P.T. Elnusa (Integrated Oil Company System)
- P.N. Timah (State Tin Mining Corporation)
- Customs and Excise Service (Finance Department)
- Department of Trade (Central Communication Network)
- Department of Agriculture (Plantations)
- Department of Communications (Aeronautical Fixed Services, Ports and Harbors)
- PJKA (State Railroad Corporation)
- BULOG (Logistics Bureau—Commodity distribution)
- Department of Defense and Security (Military, Air, Naval, and Police)

The Directorate General of Air Communications is responsible for aeronautical radio services. For radio navigation service, nondirectional beacon and VHF omni-directional radio range facilities are used. Nondirectional beacons in the low and medium frequency bands are used. There are 54 airports or aeronautical stations in Indonesia. HF radio-telephony is used for air-to-ground communications at most of those locations.

State railway communications system.—Representative of the specialized telecommunications systems operated by government establishments is the network of the State Railway Corporation (PJKA). This system includes an HF single sideband radio net which links large offices, including the headquarters, divisional offices, and subdivisions. Radio communications are possible only during daytime because of limited frequency allocations. The radio communications are used for administrative control and limited collection of rolling stock data. For other operational needs, the State Railway Authority uses Morse telegraph and telephones. Telephones with selective calling are used for most train dispatch work. On Southern Java main lines, modern teleprinter equipment is in use. A radio train dispatch system between Jakarta and Cirebon on the north Java coast has also been installed.

PJKA has proposed construction of a radio network connecting important centers in Java, in addition to a train dispatch system using a selector-operated telephone system on existing landlines.

During the current national development plan, the PJKA plans to install a UHF radio link with carrier frequency to improve communications between headquarters, the regional offices, railway yards, workshops, and other operating units. Plans also call for improvement of the telephone networks, installation of additional teleprinter exchange facilities, and installation of a selector-operated network on existing lines to service a train dispatch system.

The planned UHF radio link would service important centers such as Cirebon, Semarang, Surabaya, Cikampek, Bandung, Surakarta, Jogjakarta, and Madiun. Improvements to the telephone networks are planned in Jakarta, Bandung, Samarang, Surabaya, Jogjakarta, and Madiun. Planned teleprinter exchange facilities call for a single unit automatic teleprinter exchange with capacity of 30 subscribers and voice frequency telegraphy equipment in Java. For Sumatra, subscriber equipment will be required.

State railway authority.—Expenditures on telecommunications improvements during the Repelita II period are projected at \$15.2 million, of which \$5.6 million will be foreign exchange.

Private networks.—Private networks are frequently used to connect Jakarta offices with field operations in remote locations, such as areas of Sumatra, Kalimantan, and Irian Jaya. Currently, there are 25 private networks between Jakarta and Balikpapan and 9 between Jakarta and Medan. A leading U.S. investor has plantations in Sumatra and manufacturing facilities and marketing units in Java. It operates an SSB link between its headquarters in Jakarta and Sumatra with supplementary channels to its other installations. A leading domestic lumbering firm operates a radiotelephone between its Jakarta headquarters and various field operations. The Caltex petroleum installation in Riau Province, Sumatra, uses some 200 General Electric 150–170 MW portable two-way radios in field work. In telephone communications, Stromberg Carlson PABX automatic switching equipment is employed. Within field stations, communication is via land line and between field stations by radio.

Mobile radio systems are an innovation in the market at the present time, but their use is increasing. Taxis in Jakarta, for example, presently are using mobile radios as are police, military, and traffic communications services in large cities. Businessmen are beginning to employ mobile radios for vehicle-to-office communication. It is estimated that in 1975 there were still fewer than 1,000 mobile radios and fewer than 100 stations in operation.

P.T. Elnusa is the Pertamina subsidiary involved in communications equipment sales, operation, and installation. The firm has four divisions. Elnusa Land is responsible for the installation and servicing of point-to-point communications equipment, paging systems, sound systems, radio and TV equipment, and industrial telemetering. Elnusa Avionic installs and services navigation equipment. This division is the service agent for Collins, Bendix, RCA, Ekko, Narco, ARC, and Kings. Elnusa Data operates the data communications and processing center. Elnusa Offshore is concerned with the Integrated Oil Communications System (IOCS), which uses HF equipment. The IOCS was installed in 1973 by Elnusa and Standard Telephones and Cables Pty, Ltd. of Australia. It includes a main operations office in Jakarta and five subcenters in Balikpapan (Kalimantan), Medan (Sumatra), Pontianak (Kalimantan), Udjung Pandang (Sulawesi), and Sorong (Irian).

The Elnusa network is one of the largest in the country, with equipment valued at \$3.5 million. However, the firm is reportedly losing influence and may be absorbed by Perumtel or the Ministry of Communications. The firm's operations are closely allied with Pertamina's facilities which include 1,945 HF, single sideband, ISM, VHF, and UHF stations throughout Indonesia. Pertamina facilities also in-

clude telephonic radio, teleprinter lines, and ship-to-shore radio.

Broadcasting

There are about six million radio receivers serving an audience of at least 60 million people in Indonesia. The government-owned Radio Republic Indonesia (RRI) has 49 broadcasting stations in its national system. Each station is linked to one of the three regional networks with key stations located in Medan on Sumatra, Jogjakarta in central Java, and Ujung Pandang in Sulawesi.

In addition to the RRI national system, 169 privately owned radio stations, operating with a maximum allowable power of .25 kW, were registered as of mid-1976. Although the Government issued regulations requiring that all stations convert to medium wave by the end of March 1974, many were still operating on shortwave as of 1976. These private stations include noncommercial stations which are operated by the universities (12); provincial, regency, and municipal governments (29); the armed forces (2); Agricultural Information Department (1); and religious missionary organizations (1). Medium-wave broadcast frequencies range between 770 kHz and 1565 kHz with power rated from .25 kW to 10 kW, and shortwave between 2313 kHz and 15,300 kHz with power rated from .05 kW to 100 kW.

Television has developed rapidly as a communications medium. In 1969, there were two television studios and four transmission stations covering a reception area of 18,500 km². The system had grown by 1974 to six studios and 23 transmitting stations covering an area of 72,900 square kilometers. The TVRI uses "system B" and operates on channels E4 through E10 with power rated at .2 kW through 60 kW. The number of television sets in the country increased from 135,000 to 400,000 between 1970 and 1975. Domestic satellite communications are expected to result in a dramatic increase in television set sales.

Typical of the television studios and transmitting stations is the TVRI station inaugurated in 1970 in Medan. The station has modern studio and transmitting facilities. Equipment in use includes the following items:

- Ampex VR-1200B and 1083 video tape recorder processor
- Shimaden FP200 cameras—3 units, 2-inch Orthicon
- Shimaden control consol, video and audio control
- Shimaden box cameras for announcer
- Hokusei telecine projector for 16-mm film
- Ampex VR650 portable video tape recorder
- Shimaden studio transmission STL link

Shimaden 10-kW visual transmitter and 2-kW audio transmitter

One of the Government's goals is the wide dissemination of TV receivers throughout the country so that the population may be reached with political as well as informational and educational messages. Planned for completion by the end of Repelita II, in 1978/79 nine broadcasting stations and 40 television receiving and rebroadcasting stations are planned for completion by March 1979. Plans call for construction of six TV studios with color facilities in Jakarta.

In 1975 the Director General of Radio, TV, and Film announced the start of construction for three television stations located in Surabaya, Denpasar, and Menado in addition to 10 microwave relay stations to broadcast TV programs to surrounding areas. At the same time the Government stated its intention to construct additional TV stations and gradually expand color TV facilities.

PRINCIPAL GOVERNMENT OFFICES

The Department of Communications includes five directorates. Its Directorate General of Post and Telecommunications (at Jl. Kebon Sirih 37, Jakarta) oversees telephone, telegraph, and telex communications. In addition, the Ministry maintains a research and development center for post and telecommunications.

Perumtel has its headquarters in Bandung (Jl. Disanggarung 2, Bandung, West Java). It is a government-owned firm with common carrier rights for telephone and telegraph communications similar to that held by AT&T, Western Union, and others in the United States. The Directorate General of Post and Telecommunications guides Perumtel in general policy matters, although the company still operates as a separate enterprise with its own budget and purchasing procedures.

Licensing of all radio channels is undertaken by the Sub-Directorate of Frequency Management and Monitoring of the Directorate of Post and Telecommunications. Indonesia is a member of the International Telecommunications Union (ITU). All telecommunications, radio, and television frequencies are assigned in accordance with ITU Frequency Regulations, Article 5. Indonesia is in Region 3.

Broadcasting facilities are governed by the Broadcasting Directorate within the Ministry of Information (at Jl. Merdeka Barat 9, Jakarta). The Directorate has a television division (TVRI, Television Republic Indonesia) and a radio division (RRI, Radio Republic Indonesia). The Broadcasting Directorate operates under the control of the Director-General of Radio, TV, and Film.

TRENDS, PROGRAMS, AND PROJECTS

The Indonesian Government's long-range policy is to gradually place all telecommunications under the control of Perumtel so that private communications facilities may be phased out. Government planners feel that such a program will result in a more efficient use of the air waves which are now becoming crowded in a number of frequency ranges. However, implementation of this policy will take time because of Perumtel's limited resources and rapidly growing private sector requirements. Planners also realize that there will always be requirements for some private systems, such as mobile radio in the transport field and radio links in areas not served by Perumtel.

Government authorities say that with the initiation of the domestic communications satellite system, the various HF stations operated by government departments and private firms will gradually be closed. Leased circuits from Perumtel will be used. In 1976, all of Pertamina's telecommunications facilities, except the Elnusa operations, were being integrated into the Perumtel system.

Indonesia's satellite will be capable of providing multiple channels of television and radio broadcasts to stations in all 26 provinces. During the initial phase of the system, the master control station and one other Earth station will transmit TV signals to the satellite. Earth stations located in the provinces and equipped to receive these signals will rebroadcast them locally.

Earth receiver stations are being considered for location at schools or universities for the reception of educational and instructional TV programs. The next generation satellite could employ high-powered transmitters capable of providing good quality TV signals to very low-cost Earth stations, serviced by smaller antennas.

U.N. officials and American experts in educational television have been called in to help the Education Department prepare programs. The first, to be transmitted by 1977, will be for teacher training colleges. Vocational and technical training programs will start a year later, programs for elementary and high school teachers and students will be broadcast by 1979, and programs for adults and nonformal education by 1980. Learning centers will be established in remote areas. Some programs will be designed for use by teachers at home or in groups and will combine TV and radio instruction with written correspondence materials. Overall direction will come from a national educational broadcasting center in Jakarta and 15 regional media centers. The initial video capability of the system is one channel

with transmission facilities at either Jakarta or Surabaya.

International and foreign assistance and concessionary financing have played an important role in the rehabilitation and expansion of the telecommunications system. The Trans-Sumatra microwave system has been financed primarily through an International Development Association (IDA) loan of \$12.8 million, while the Java-Bali-South Sulawesi system has been financed by Japanese project aid.

The U.S. Exim Bank has played a key role in the development of the Domestic Communications Satellite project. The Government of Canada has provided technical assistance in the form of training for Perumtel personnel in the operation and maintenance of microwave systems. The U.S. Agency for International Development (AID) plans for expansion of technical and scientific assistance during FY 1978 and envisions such projects as "Development of Software for Use of the Domestic Communications Satellite for Educational Purposes" and "Pilot Test Health Information Radio Programs."

The United Nations Development Program (UNDP) has offered communications assistance programs to the Indonesian Government. Programs initiated or proposed during 1975 and valued at about \$2.2 million included the establishment of a telecommunications test and development center, training for domestic communications satellite system operations and maintenance personnel, assistance in preparation of master plans for the telephone switching network, and establishment of a national radio frequency monitoring system.

GROWTH PROSPECTS

Clearly, Repelita II plans will be exceeded in the area of both landline and electronic telecommunications. Repelita II called for an addition of 108,900 line units in Jakarta and 93,600 units outside the capital by 1978/79. In fact, 394,200 line units will be added during the plan period. The Government has established the domestic communications satellite system, a project not even included in original Repelita II programs. The decision to launch the satellite and build the necessary land-based infrastructure to use it marks the explosive growth of the telecommunications equipment market during the Repelita II period.

Between 1975 and 1978, Perumtel will have made \$1.6 billion in capital investments. There may be a decline in the rate of investment after 1978, when the bulk of the communications satellite and landline expansion will have been completed.

Growth may shift from common carrier to other telecommunications equipment. Military require-

ments for telecommunications equipment will have to be met, and substantial expenditures will be required by the end of Repelita II. The increased availability of line units resulting from satellite relay will lead to greater expenditures in the private sector on PABX units. The demand for Perumtel services will be greater than ever.

Further spending for telecommunications development will be severely restricted by budget constraints as a result of the Pertamina financial problems. Ongoing programs and commitments have been funded, but it is clear that new programs probably will not find available funds.

MARKET SIZE

The market for communications equipment grew from \$69 million to \$182 million between 1973 and 1975. The market is expected to reach \$365 million in 1980. The major portion of communications equipment is imported, although there are some significant local manufacturing facilities (see table 1).

Table 1.—Indonesia: Size of Market for Telecommunications Equipment

(in thousands of U.S. dollars)

	1973	1974	1975	1976	1980
Radio telecommunications equipment¹					
Domestic production ..	—	20	100	150	300
Imports					
United States	1,158	1,476	51,610	101,770	22,620
Japan	4,546	5,796	6,460	—	—
West Germany	3,935	5,153	5,490	—	—
Holland	570	1,040	970	—	—
Sweden	422	266	320	—	—
United Kingdom	400	820	960	—	—
Others	481	137	320	—	—
Subtotal	11,512	14,688	66,130	117,750	44,160
Total Market	11,512	14,708	66,230	117,900	44,460
Line communication equipment²					
Domestic production ..	10,000	15,000	20,000	35,000	40,000
Imports					
United States	90	320	470	700	2,540
Netherlands	6,330	9,500	14,130	—	—
West Germany	5,080	4,600	8,290	—	—
Sweden	1,000	2,200	2,820	—	—
Japan	700	600	1,180	—	—
France	150	440	470	—	—
Others	1,330	1,760	2,700	—	—
Subtotal	14,680	19,420	30,060	50,710	30,980
Total Market	24,680	34,420	50,060	85,710	70,980
Electronic production equipment					
Domestic production ..	—	—	—	—	—
Imports					
United States	190	640	850	670	880
West Germany	250	370	400	—	—
Japan	220	320	350	—	—
Switzerland	50	70	50	—	—
United Kingdom	10	10	10	—	—
France	10	10	10	—	—

Table 1.—Indonesia: Size of Market for Telecommunications Equipment—Continued

	1973	1974	1975	1976	1980
Others	20	20	20	—	—
Subtotal	750	1,440	1,720	1,620	2,410
Total Market	750	1,440	1,720	1,620	2,410
Testing and control equipment					
Domestic production ..	—	—	—	—	—
Imports					
United States	504	565	524	576	690
Japan	1,378	1,155	1,400	—	—
West Germany	490	342	470	—	—
United Kingdom	154	288	230	—	—
Denmark	75	54	60	—	—
Canada	10	70	57	—	—
Others	119	36	170	—	—
Subtotal	2,730	2,510	2,911	3,202	3,838
Total Market	2,730	2,510	2,911	3,202	3,838
Electronic components					
Domestic production ..	6,500	7,500	20,000	25,000	100,000
Imports					
United States	230	250	800	1,100	2,400
Japan	6,500	10,600	11,300	—	—
Taiwan	500	700	1,500	—	—
South Korea	500	800	1,300	—	—
Singapore	400	500	700	—	—
Netherlands	50	70	300	—	—
Others	150	200	480	—	—
Subtotal	8,330	13,120	16,380	19,180	34,300
Exports	6,000	7,000	19,500	24,000	90,000
Total Market	8,830	13,620	16,880	20,180	44,300
Consumer radio and TV equipment					
Domestic production ..	14,700	27,350	32,000	68,000	180,000
Imports					
United States	200	300	450	650	900
Japan	3,900	65,000	8,450	—	—
Singapore	900	1,500	1,950	—	—
Taiwan	400	600	750	—	—
Netherlands	300	650	600	—	—
South Korea	180	300	400	—	—
Others	300	500	650	—	—
Subtotal	6,180	10,350	13,250	15,300	20,000
Exports	—	100	150	200	350
Total Market	20,880	37,600	45,100	83,100	199,650
Total Market Size	69,382	104,298	154,101	311,712	365,638

¹ Includes radio telecommunications equipment, microwave relay, radio and television broadcasting, and other nonlinear equipment for transmission and reception of radio signals.

² Includes electrical line telephone and telegraph transmission and reception equipment.

Sources: Official Indonesian and supplier statistics and estimates based on trade source interviews.

Imports

Between 1975 and 1980 the market for radio telecommunications equipment will decline from \$66 million to \$44 million with completion of the domestic communications satellite program. Because of American involvement in the communications satellite program, the majority of imported radio telecommunications equipment in 1975 was bought from the United States. It is expected that by 1980 U.S. suppliers will maintain a leadership position as a result of add-on equipment needs in conjunction with the satellite system.

Landline communications equipment sales between 1975 and 1980 will increase from \$50 million to about \$70 million. Dutch suppliers had the largest market share of landline equipment in 1975 with 47% of the import market, followed by West German suppliers with 28%, and Swedish suppliers with 9%. Dutch suppliers are expected to maintain their lead through 1980 but domestic production is expected to surpass imports.

Sales of consumer radio and television equipment will increase dramatically in the 1975-80 period as a result of the additional channels made available through the satellite program, and also as a result of increased prosperity in many segments of the population. The boom in consumer electronics sales will result in greater local production of radios and television sets. Rapidly growing production will boost the market for electronic components and subassemblies from \$16 million in 1975 to an estimated \$44 million in 1980.

Consumer radio and television sales consist of domestically assembled and produced items and imported goods. In 1975, about 70% of these sales were from local production and assembly; the remainder was imported. By 1980, an estimated 90% of consumption will be supplied by local production. Japanese suppliers are the main source of imported consumer electronics with a 64% import share in 1975. Suppliers from Singapore, Taiwan, the Netherlands, and South Korea followed. By 1980, the Japanese are expected to have a 65% market share.

The growth in sales of communication and electronic test and control instruments and electronic production equipment will also be strong, with the former market rising from \$3-4 million annually during the 1975-80 period and the latter from \$1-2 million. All items in this field are imported. Japanese suppliers held 48% of the market for communication and electronic testing and control equipment in 1975, followed by U.S. suppliers with 18%, and West Germany with 16%. A similar pattern is expected to continue through 1980. U.S. suppliers are expected to maintain their lead in sales of electronic production and test equipment with about 50% of the 1980 market.

The bulk of local electronic components production is for reexport and does not have a significant impact on the home market. Although some components are made domestically for use in the assembly of electronics, the largest portion of components used by domestic manufacturers comes from Japan, Taiwan, and South Korea.

Domestic Manufacturing

Local production of communications equipment in Indonesia consists primarily of radio sets, television

sets, electronic components, and assembly of landline communications equipment.

In 1971, the Indonesian Government prohibited the import of assembled radio and television receivers. Since then there has been a dramatic increase in sales of unassembled or partially assembled parts for assembly in Indonesia.

Because of the low-cost labor, American manufacturers have increased their production of electronic components in Indonesia. Most of this output is directly reexported.

Landline equipment suppliers assemble significant portions of their products in Indonesia in order to offer lower costs to Perumtel, the principal buyer.

The five major wire and cable manufacturers have a combined single-shift capacity for telecommunications cable of approximately 2,900 tons per year. Production could easily be expanded using present equipment. Sales are not commensurate with productive capacity.

P.T. Kabel Indonesia started production in 1973 with an average annual output of 1,400 tons of telecommunications cable. Started in 1963, P.T. Terang Kita produces underground telephone cable of up to 1,200 pairs per cable. The firm's average yearly sales of telecommunications cable is \$200,000.

Manufacturing of landline equipment is done by P.T. Industri Telekomunikasi (P.T. Inti), a government-owned firm established by Perumtel in 1967, and associated with Siemens and ITT.

The factory opened in 1974. It produces and assembles telephones, automatic switching telephone exchanges, and radio telecommunications equipment. Most of the firm's output goes to Perumtel. The bulk of production consists of assembly from imported components. Telephone handsets have a greater portion of local input including cases that are injection molded locally. Production is generally sporadic and dependent on contract awards. Output was far below capacity in 1975 because of insufficient capital and lack of skilled manpower. In 1975, the firm had about 500 workers. The work force doubled to 1,000 in 1976.

In addition to manufacturing P.T. Inti also contracts with Siemens to assemble equipment required for Siemens's sales contracts in Indonesia. In 1976, an estimated 30,000 line units of exchange equipment were assembled in addition to telephone handsets.

Radio communications equipment is also manufactured by P.T. Inti in cooperation with the Japan Radio Corporation (JRC). Equipment assembled or manufactured includes single sideband transmitters, receivers and transceivers, multichannel UHF equipment, and single/multichannel VHF equipment.

Bell Telephone Manufacturing of Belgium, an ITT subsidiary, has an Indonesian plant which manufactures telephone sets and coin-operated phones. It also assembles Pentaconta exchange equipment and pairsaver substation electronic carrier equipment. Production capacity in 1976 was approximately 296,000 telephones. Total shipments were valued at about \$15 million. It is not clear whether this level of production will be maintained after present contracts are completed, but the firm sees some possibilities for exporting equipment to Association of Southeast Asian Nations (ASEAN) countries.

Manufacture of Electronic Products

Estimated production of electronic products in 1975, was as follows:

<i>Product</i>	<i>No. of Units</i>
Radio receivers	1,000,000
Radio cassettes/cassette recorders	160,000
Television sets	135,000
Amplifiers	12,000
Electronic calculators	1,500
Communication radios	250

Consumer electronics.—Producers of TV and radio sets in Indonesia fit into three categories: Those using local brand names and importing their components from around the world, those using Japanese trademarks and importing their components only from Japan, and companies affiliated with and using components from European firms. Local and Japanese-brand products are price competitive. Local brands, which often use low-priced components from Hong Kong, Taiwan, and Korea, are not as popular as Japanese brands. European manufacturers such as Grundig and Philips make prestige products at higher prices.

The major manufacturers of radio and television receiving sets, about 70% of total domestic production, are P.T. Philips-Ralin Indonesia Ltd., a joint venture between the Indonesian Government and Philips of the Netherlands; and P.T. National Gobel, a joint venture between Japan's Matsushita Ltd. and a local firm. Using local and imported components, National Gobel manufactures 12-inch to 24-inch TV sets, TV cabinets, variable resistors and other components, cassette tape recorders, and radios. Philips-Ralin employs about 1,000 people and produces 250,000 radio receiving sets and 15,000 TV sets annually. The company makes printed circuit boards, transistors, integrated circuits, loudspeakers, transformers, and cabinets for its radio and TV sets. Plans call for production of color sets in the near future. The firm intends to establish a manufacturing center in Medan, North Sumatra, to supply components for its outlets in Southeast Asia.

The Indonesian Government encourages local manufacturing of TV sets. The Electronics Department of the National Institute of Sciences (LIPI) has designed a low-priced TV receiver, and has manufactured a 100-W television transmitter, 50 and 10-W FM transmitters, FM transceivers and repeaters, and SW transceivers.

Electronic components manufacture.—Four American companies have set up plants for producing electronic components in Indonesia for export. These firms are assembly operations importing basic materials and parts from the United States and other countries, performing labor-intensive operations in Indonesia, and exporting the output to the United States.

P.T. Monsanto Pan Electronics in Jakarta started assembly of light emitting diodes in 1973. P.T. Fairchild Semiconductor in Jakarta and P.T. National Semiconductor in Bandung began assembling integrated circuits in 1974. Investments for each firm has ranged between \$3 million and \$6 million.

P.T. Fairchild Semiconductor Indonesia, a subsidiary of the United States Fairchild Camera and Instrument Corporation, has about 1,000 employees in its new factory near Jakarta. In locating the plant the firm received encouragement from the Governor of Jakarta, who is interested in bringing labor-intensive, low-pollution industries to the city. Fairchild management says that, with intensive training and supervision, electronics manufacturing in Indonesia can be very successful. They expanded their work force to 1,700 in mid-1976 and planned to employ 2,100 to 2,200 by the end of the year.

MARKET OPPORTUNITIES

Long-range market potential appears to be good for all types of communications equipment, particularly because of the impact of the domestic communications satellite program. There is a need for landline electronic and microwave equipment for linking telephone exchanges with long-range radio links.

The highest demand in the private sector will be for PABX or PBX equipment and teleprinters. In 1976 the PABX market for the next few years was estimated at approximately 10,000 lines per year, valued at \$20 million. Most units are in the 40- to 200-line range, but some installations (such as those in hotels) go up to 1,000 lines. Compact electronic models would have good sales potential.

Teleprinter sales are expected to grow rapidly as more Telex lines are made available and as international and domestic communications improve with satellite technology. The 1976 market for teleprinters

was an estimated 3,000 units valued at approximately \$5 million.

Two-way radios have good potential. Currently, the market for these radios in Indonesia is about \$8 million per year. Some 50% of sales are for commercial purposes, such as petroleum and mining industries, and 50% for Government uses such as police and military agencies. Portables make up about one-third of the two-way radio market; another third consists of mobile radios; and the final third is fixed systems. Single sideband radio is being used increasingly in Indonesia.

Radiotelephone systems are coming into wider use. These systems must often be connected with landline systems.

The communications satellite program will involve continuing expenditures for highly sophisticated equipment. Testing, repair, and replacement items will be needed, along with additional consulting services. One industry expert mentioned continuing needs for assistance in training repair personnel and for advice on the planning, conceptual, and programming aspects of the system. The communications satellite has a 10-year life expectancy. Plans call for replacement satellites to be launched in about 7 years.

There are excellent opportunities for sales of consulting and technical assistance services to end users particularly Perumtel and other Government agencies associated with the communications satellite program. Teleconsult of the United States has already provided Perumtel with consulting services, and there is need for both consulting and training services on system design, application, and maintenance. Perumtel also requires assistance in improving maintenance of its telecommunications network, radio frequency monitoring, and other aspects of telecommunications systems management.

Demand for television and radio broadcasting equipment will continue because of the wider dissemination of television and radio receivers and system expansion resulting from the communications satellite program.

New television stations will require video tape systems (both portable and stationary), studio cameras, audio and video control console, 16 mm film projectors, studio transmission links, visual transmitters in the 10-kW range, and audio transmitters in the 2-kW range.

Closed circuit television (CCTV) systems are growing in popularity for use in a wide variety of applications. These include entertainment of construction crews in remote locations; and security systems in factories, hotels, hospitals, banks, and commercial establishments. Annual CCTV sales are about \$500,000.

The Government has emphasized economic and civil development rather than military expenditures during the Repelita I and Repelita II plan periods. However, it is expected that military expenditures may increase as strategic and security concerns become more immediate.

Military requirements are expected to include radar sets, satellite ground stations, and personnel and vehicle radio communications equipment. Knowledgeable trade sources indicate that military plans call for the building of about five radar units, each valued at about \$1.5 million, in the coming years. A military satellite communications system, to be installed, will have one transponder in the domestic communications satellite. The system will include one master control antenna valued at \$3 million to \$4 million, four or five medium traffic stations valued at about \$1 million each, and about 400 small stations costing about \$100,000 each. Personnel radio communications or "manpack" sets, SSB type for long-range use and UHF/VHF type for short-range use, will also be purchased. Plans call for 6,000 units each. In addition, it is estimated that about 2,000 military vehicle communications sets or "tank sets," mostly of the SSB type but including UHF/VHF types, will be purchased. Specialized communications equipment for command centers and war rooms will probably also be purchased.

IMPORT PROCUREMENT

Buyers Universe

The communications equipment buyers universe can best be grouped into government and private market sectors. In the government sector, Perumtel has the largest buying power. As previously mentioned, other departments in Government have their own communications systems. However, it is expected that Perumtel will gradually take over management of communications systems existing in other government departments, with the exception of the military.

Purchasing by Perumtel is centered in the organization's main office in Bandung at the following address:

Director of Purchasing
Perusahaan Umum Telekomunikasi
(Perumtel)
#2 Jalan Disanggarung
Bandung, West Java

Open bidding procedures are often followed by the organization, particularly in the case of large purchases. Inquiries at some local Perumtel offices in various parts of the country revealed that purchasing is often centralized. A representative of the

Medan office of Perumtel, for example, said that all Medan's purchasing decisions were made in Bandung.

In recent years Perumtel has shown more care and sophistication in purchasing policies. Consultants are used to a greater extent in planning equipment purchases and evaluating equipment qualities. Emphasis on quality standardization also is increasing.

Indonesia is a member of the ITU, which is headquartered in Geneva, Switzerland. ITU standards adopted by Indonesia include the Consultative Committee for International Telephone and Telegraph (CCITT) and the Consultative Committee for Radio (CCIR) recommendations.

Equipment specifications made by Perumtel now adhere to CCITT and CCIR recommendations. One expert said, "The days of the glossy booklets are over for suppliers to Perumtel. No one will sell equipment not adhering to the CCITT and CCIR recommendations."

Small purchases of military communications equipment are handled by the Department of Defense and Security's Procurement Division of the individual armed services. Large purchases are generally made through the Ministry of Defense and Security headquarters. The key address for military equipment procurement is:

Department of Defense and Security
Procurement Division
Jl. Merdeka Barat 13
Jakarta, Indonesia

Purchasing of television, radio, and broadcasting equipment by the Government is under the Department of Information's Director-General of Radio, TV, and Film, at Jl. Merdeka Barat 9 Jakarta, Indonesia.

The chief private users of telecommunications equipment are in the mining and petroleum, transportation, forest resources production, and agro-industry sectors. The structure and size as well as procurement practices of each of these user groups, and other manufacturing commercial and service industries, are covered in the individual sector reports.

Foreign Suppliers Universe

Suppliers of telecommunications equipment in Indonesia include three groups: (1) multinational firms who have local subsidiary organizations to assemble, install, and service imported equipment; (2) firms which use only a local representative who undertakes sales, service, and installation; and (3) firms who supply the market from their home or regional offices. P.T. Siemens Indonesia is an ex-

ample of the first group. This subsidiary of the German firm has a large local organization with expatriate and local staff. Continuing liaison is maintained with Perumtel directly, while sales of small items are made either directly or through local distributors. The firm maintains its own repair and assembly facilities for equipment and components imported from its home base.

An example of a firm in the second category is Oki of Japan, supplier of teleprinters, telephones, and switching equipment. The firm's local agent, N.V. Marco, imports equipment from Japan and provides authorized service and installation facilities from offices in Jakarta, Surabaya, and Bandung.

The supply of telecommunications central office equipment is dominated by European suppliers because of their traditional presence in the Indonesian market and their continuing aggressive sales efforts. The leading suppliers are Siemens of Germany with over half the market, followed by Philips of the Netherlands, and L.M. Ericsson of Sweden. Major suppliers of cables and other items include: Nederland Kabel Fabriek of the Netherlands and BICC Ltd., and Bell Telephone Manufacturing (BTM) of Belgium. International Telephone and Telegraph (ITT), the American multinational firm, is the owner of BTM of Belgium. Other U.S.-owned European subsidiaries supplying communications equipment to the Indonesian market include Standard Elektrik Lorenz A.G. (ITT) and A.E.G. Telefunken (General Electric Corp.), of Germany; Standard Telephones and Cables Ltd. (ITT), of the United Kingdom; and Standard Telephones and Cables (ITT), of Australia.

In the market for PABX equipment, European firms such as Siemens, L.M. Ericsson, Philips, and ITT's European subsidiaries are the leaders. However, Japanese suppliers such as Nippon Electric Company (NEC), Oki, and Iwatsu have recently taken strong market positions.

The teleprinter market is dominated by European suppliers. It is estimated that Siemens of West Germany has over 50% of the market, followed by Standard Elektrik Lorenz, with about 35%. Olivetti of Italy and Sagem of France have smaller shares.

In electronic telecommunications equipment, both Japanese and German suppliers have significant market positions. Philips of the Netherlands is strong in sales of radio telecommunications equipment such as mobile radio, HF, UHF, and VHF equipment. Other major suppliers include: AEG-Telefunken of Germany and Pye of the United Kingdom. Japanese suppliers are dominant in the field of microwave equipment, with NEC and Toshiba having the leading positions.

In the category of radio and television broadcasting equipment, European and Japanese suppliers hold the most significant market shares. Major Japanese suppliers include NEC Toshiba, Matsushita, Shibaden, and Hokusei. Leading suppliers from Europe include Siemens of Germany, Thompson of France, Philips of the Netherlands, AEG-Telefunken of West Germany, and Pye of England.

It is significant that in many cases European suppliers have gained entry to the market as a result of financial support from their Governments. For example, in 1975 the British Government financed a television transmission equipment project for Indonesia's Department of Information. The contract, awarded to Pye, included \$16 million worth of equipment for 10 complete television transmitting stations, in addition to the modernizing of five regional studios.

MARKETING FACTORS

Distribution of communications equipment takes two major routes in Indonesia, directly from supplier to end users or from supplier to local representative and then to end user. In the case of Government purchases, both distribution channels are used. Sales to the private sector are usually made through local representatives.

The most important factors in industry sales are (1) price and financing, (2) historical position in the market, and (3) local representation.

In competitive bidding by Perumtel and other organizations, price and finance are often the major considerations. Since the demand for Perumtel's communications services is greatly under-satisfied, there is a need for more equipment. However, during 1975 and 1976, Perumtel spent heavily on the communications satellite program as well as on additional telephone line units, and internal funds are limited. Outside funds and supplier credits will therefore be required to effect sales. For example, the sale of 102,500 telephone line units for local and trunk exchanges in Jakarta and outside Java by BTM of Belgium was financed by a loan from the Societe Generale de Banque S.A. of \$130 million with an interest rate of about 8%, payable in 10 years. The sale by Philips and NKF of The Netherlands of telephone equipment to increase the number of telephone line units in Jakarta was financed by a loan from the Algemene Bank of the Netherlands.

The financing factor also is important in sales to the smaller end users in both the Government and private sectors. Firms able to offer liberal credit terms will have an advantageous position in the market.

Firms having a long history of sales are in a strong market position. A prime case in point is that of the step-by-step switching system used by Perumtel and others. European suppliers such as Siemens first supplied this equipment, and additions to the system had to come either from the same suppliers or those able to duplicate the design. In this case, it is difficult for U.S. suppliers of crossbar-type switching equipment to penetrate the market, since their components will not work in conjunction with the existing system.

Strong local representation in the market has also been a major factor in decisions regarding equipment purchases by Perumtel and other organizations. Informal relations with key officials, a continuing monitoring of industry, and regular contact with technical personnel are all important in closing sales of communications equipment.

The leading overseas suppliers have their own offices in Indonesia and are thus able to promote sales and generally give direct support to their local representatives. For example, ITT, L.M. Ericsson, Siemens, and Philips all have expatriate employees in Indonesia, in addition to local representatives.

Aftersales service is a key factor in continued sales, particularly to the private sector. Some successful firms have representatives in Jakarta who provide service and have offices in various parts of the country, others have regional operations in Singapore or Hong Kong where service personnel are based and sent on service missions to clients in Indonesia. A number of successful suppliers employ equipment demonstrations to promote their products. However, such demonstrations are normally directed at specific end-user and buyer groups rather than the general public.

COMPETITIVE POSITION OF U.S. SUPPLIERS

The position of U.S. suppliers of telecommunications equipment in the Indonesian market has been dramatically enhanced by the domestic satellite program. The approach of Hughes Aircraft Systems International, emphasizing high technology and a financial package, is an example of the successful marketing of a major project to the Indonesian Government. Of the total \$161 million foreign exchange cost of the satellite system, 35% was financed by the U.S. Exim Bank, 55% by a consortium led by the Bank of America, and 10% by the Indonesian Government.

Based on an assessment of Indonesia's development requirements and government planning, Hughes identified Indonesia as a country with high potential for their communications satellite system.

Hughes home office representatives initiated a program of regular visits and consultation with Indonesian government telecommunication and planning officials in the early 1970's. In the satellite proposal, emphasis was placed on the long-range economic, social, and political benefits of the system, as well as immediate improvements in telecommunications capabilities. Hughes was able to demonstrate its experience and expertise in the satellite communications field, by virtue of its previous handling of projects for Western Union and the Government of Canada.

Perumtel agreed to fund a \$1-million "Systems Definition Contract" to cover an initial site survey and network analysis as a basis for determining the necessary satellite configuration. Timing of project completion was critical to the Indonesian Government, because it wished to have the system operational by August 1976. A number of factors were involved in the timing of the project, including the Government's wish to be able to employ the system in its information program in support of the national elections scheduled for 1977. To expedite project implementation, Hughes proposed that the project be divided among three firms. Hughes undertook to provide two satellites, one for the initial launch and one for reserve, as well as to build 10 ground stations including the master control station, five main traffic stations, and four light traffic stations. Hughes nominated Aeroneutronic-Ford and the ITT subsidiary Federal Electric International to divide the construction of the remaining 13 main traffic stations and 17 light traffic stations.

Hughes began developing the financing package in 1972. The final increment of U.S. Exim Bank participation was authorized in October 1975, bringing the bank's total participation in the project up to \$56 million, with interest between 8% to 8¾%, with repayment from 7 to 8 years. The remainder of the \$161 million in financing was spread among 6 co-managers and 27 other banks.

U.S. firms will have many opportunities to supply equipment for the telecommunications spinoffs resulting from the inauguration of the domestic satellite system, including common carrier, radio and TV broadcasting, private communications, military, and other applications. Development of data communications systems is also expected to be accelerated by the satellite systems, and equipment to insure communications reliability will also find a growing market.

U.S. military telecommunications equipment also has an excellent potential in Indonesia. Many Indonesian military officers have visited the United States and familiarized themselves with U.S. equipment, which is highly regarded by the Indonesian Armed

Forces because of its design features and capabilities.

U.S. suppliers are expected to take a stronger position in the PABX market as a result of their lead in electronic equipment technology. ITT, for example, plans to supply Indonesia with electronic PABX equipment from its ITT Telcoms subsidiary in Raleigh, North Carolina.

U.S. suppliers of radio and television broadcast equipment are not well represented in Indonesia and generally lack local presence. However, some U.S.-manufactured items are sold, including video tape recorders; both RCA and Ampex equipment is in use.

Leading U.S. suppliers of HF, VHF, and UHF radio transmitters, receivers, and transceivers include Raytheon and Motorola.

Industry experts say that several types of specialized telecommunications auxiliary equipment from the United States would have good potential in the Indonesian market, but initial exposure and more aggressive marketing efforts by U.S. firms are needed. For example, U.S.-manufactured teleprinters are recognized for their durability and prices are as much as 50% lower than those of competitors but supplier have been remiss in developing their sales.

U.S. communications equipment is generally known for its ease of operation and reliability. However, U.S. suppliers have been weak on aftersales service. In addition, longer delivery times offered by U.S. suppliers place them at a disadvantage vis-a-vis the leading European firms which maintain stocks in Indonesia and the Japanese firms which provide faster delivery.

Trade sources indicate that successful U.S. suppliers must have good quality representation in Indonesia, including personnel who are able to establish good relations and contacts with government and other decisionmaking groups. U.S. firms, in general, are not as well represented as competing firms such as Siemens, L.M. Ericsson, and Philips. ITT, however, has established a major presence in the market, although their offices also represent their non-U.S. subsidiaries. Aeroneutronics-Ford and Hughes have local offices because of their satellite contracts. Collins Radio also is represented in Indonesia through its Australian subsidiary.

There are good possibilities for U.S. firms to sell consulting and training services to improve organizational procedures, and to provide technical recommendations and maintenance functions to Perumtel and other end users. Indonesia generally offers excellent sales opportunities to U.S. firms in the communications field who establish appropriate representation and effectively service their accounts.

Textiles and Wearing Apparel

The high priority given by the Indonesian Government to the textile industry and changing styles of living and dress should stimulate increased production of both textiles and garments. The market for textile and apparel manufacturing equipment in 1975 was \$137 million. By 1980 total equipment sales are expected to rise to \$265 million, which will include \$129 million worth of spinning equipment, \$82 million of equipment for weaving and knitting or fabric production, \$35 million of finishing equipment, and \$18 million of garment manufacturing equipment.

Increased demand for textile products should sustain sales of all types of machinery. Concern for increased quality and variety will turn attention to equipment with close tolerances and versatility. There is no competition from domestic producers. Suppliers from Japan, Germany, and Switzerland, who offer quality equipment and liberal financing, hold a predominant share of the market. American firms will have to initiate a more positive and active market development strategy if they wish to obtain a larger share of the growing equipment market.

STRUCTURE AND SIZE

In 1975, 1,693 firms were registered with the Directorate-General of Textile Industry. Industry

sources estimate that an additional 5,085 firms are operating at the cottage industry level (see table 1). The industry grew rapidly between 1970 and 1975 with the number of spinning firms and operating spindles tripling. Over the same period weaving companies increased from 37 to 773 with a 635% increase in the number of looms. However, only 21 of the weaving firms have more than 400 looms. Knitting firms numbered 235, nine times the 1970 figure of 27.

Foreign capital has played an important role in development of the industry. Between 1967 and 1975 there were 95 foreign investment applications, with 65 approvals representing capital investment of \$1 billion. There were 420 domestic investment approvals valued at \$1.1 billion; a number of these ventures also involved foreign financial backing. The Government has also invested heavily in the industry. Leading producers include Government-owned, joint Government-private, foreign and domestic joint venture, and domestically owned enterprises (see table 2). The following profiles are of representative firms in the industry.

P.N. Industri Sandang, (the state textile industry corporation), organized in 1967, has expanded to include 11 textile operations. In 1976 they were operating at over 90% capacity and produced 132,482

Table 1.—Indonesia: Textile Manufacturers by Product and Location, 1975

	Jakarta	West Java	Central Java	Jogjakarta	East Java	North Sumatra	West Sumatra	South Sumatra	West Kali- mantan	South Sulawesi	Bali	Total
Fibre making	—	4	—	—	—	—	—	—	—	—	—	—
Spinning	5	30	7	2	8	2	—	—	—	—	1	55
False twisting	5	17	2	—	1	—	—	—	—	—	—	25
Sewing thread	6	4	—	—	24	1	—	—	—	—	—	55
Weaving	26	503	136	19	43	32	4	1	1	4	4	773
Knitting	73	100	16	3	32	9	—	—	—	1	1	235
Embroidery	1	3	—	—	—	—	—	—	—	—	—	4
Printing	5	24	8	—	3	2	—	—	—	—	—	42
Finishing	30	83	44	2	15	8	1	1	—	2	2	188
Dyeing	35	116	20	1	14	14	1	1	—	3	2	207
Ready-made garments	71	22	9	2	15	2	—	—	—	1	1	123
Carpets/Rugs	1	1	—	—	—	—	—	—	—	—	—	2
TOTAL:	258	907	242	29	155	70	6	3	1	11	11	1,693

Source: Directorate-General of Textile Industry.

Table 2.—Indonesia: Major Textile and Apparel Producers

Firm	Location	Production
Bata N.V. Perusahaan Sepatu	Jakarta	Shoes
Batik Keris	Solo	Weaving, Knitting, Finishing, Garment Manufacture
P.T. Daralon	Jakarta	Synthetic Fabric
P.T. Eratex Djaja Ltd. ..	East Java	Integrated Textile manufacturing (Yarn, grey cloth, knitted, fabric, garments, suits, shirts)
P.T. First Power Garment Factory Indonesia	Jakarta	Garment industry (Jackets, pants, blouses, shirts, pyjamas, raincoats)
P.T. Garuda Textile	Jakarta	Garment industry
P.T. Glamour Industrial Corp.	Pasar Rebo, Jakarta	Garment Factory & Warp Knitting mill
P.T. Good Faith Industrial Corp.	Jakarta	Work Knitting, Raschal Lace, embroidery, false twisting, dyeing, finishing, synthetic yarn, tricolors.
Harapan Textile Ltd.	West Java	Integrated Textile Mill
P.N. Industri Sandung ...	Multiple Locations	Spinning and weaving
P.T. Inbritex	Pleret, Pasuruhan, East Java	Cotton Weaving
P.T. Indonesia Synthetics Textile Mills	Tangerang, West Java,	Nylon Polyester Fibre Manufacturing
P.T. Indonesia Toray Synthetics	Tangerang, West Java	Nylon/Polyester Fibre Plant (Nylon filament yarn, Polyester staple fibre)
Kewaram Indonesia	Jakarta	Textile Manufacturing
P.T. Kudus Spinning Mills	Central Java	Textile Spinning Factory (Polyester/Cotton Yarn)
P.T. Kurary Manunggal	West Java	Textile Polyester Fibre Plant
P.T. Likespring	Jakarta	Shirts
P.T. Lima Jaya Garment Co.	Jakarta, Bondet Warehouse	Textile Knitting & Garment Industry (shirts, pants, pyjamas, knitwear etc.)
Maluk International Textile	West Java	Integrated Textile Mill (synthetic acrylic yarn, blended yarn, false twisting, nylon stretch, polyester textured yarn)
P.T. Mermaid Textile Industry Indonesia	East Java	Integrated Textile Mill (cotton, polyester)
P.T. Mulia Knitting Factory	Jakarta	Knitting and Garment Manufacturing
P.T. Naga Mas Garment Manufacture Co. Ltd. .	Jakarta	Garment & Towel factory (pyjamas, trousers, towels for export)
P.T. New Diamond Textile Industry Ltd.	Jakarta	Garment Factory Warp Knitting Mill (Tricot, Raschal Lace)

Table 2.—Indonesia: Major Textile and Apparel Producers—Continued

Firm	Location	Production
P.T. Oceanic Cotton Mill Ltd.	—West Java (Bandung) —East Java	Spinning Mill
P.T. Pacific Garment ...	Jakarta	Industry Garment (Textile) for export
P.T. Pan Asia Textiles (Indotex)	East Java	Spinning Mill
P.T. Patal Indomahon	Jakarta	Spinning Mill (Synthetic fibre)
P.T. Peony Blanket Industrial Co. Ltd.	Kranjil, Bekasi	Integrated Textile Industry
P.T. Primatexco Indonesia	Central Java	Textile manufacturing (Cotton yarn, bleach processing, synthetic fibre, chemical grade cambric)
P.T. Prominator Construction Corp.	Bandung	General Contracting, synthetic fibre, chemical textile
P.T. Purnama	Semarang	Integrated Textile Mill (sewing, thread garment, shirting, suiting, voiles, embroidered, crepe, georgette, handkerchiefs, towels)
P.T. Sima Concern	Medan	Knitting, synthetic
P.T. Southern Cross Textile Industry	Jl. Raya Bogor Km.26 Ciracas, Pasar Rebo	Textile Manufacturing
P.T. Swan Indonesia	Surabaya	Textile, Stretched Yarn & Socks Mfg.
P.T. Texfibre Indonesia ..	Jatiluhur	Nylon stretched yarn, Nylon/Polyester
P.T. Textra	Jakarta	Spinning, Synthetic and Cotton
P.T. Tristate Industrial Indonesia	East Java	Garment Factory
P.T. Tytex Diamond Industry Corp.	Semarang	Integrated Textile Mill (yarn, garment, sewing thread, dyestuff woven, knitted, finished fabric)
P.T. Union Textile Industries	West Java	Integrated Textile Manufacturing (Polyester, Cotton)
P.T. Uniroyal	North Sumatra (Kisaran)	Rubber Sandals
P.T. United Synthetic Textile Co. Ltd.	Bogor	Textile Manufacturing, Knitted fabric
P.T. Unitex	Jakarta, Bogor	Textile Manufacturing
P.T. Universal Textiles ..	Jakarta	Integrated Textile Mill (Brand: "UNITEN") Polyester/Cotton Shirting Polyester viscose suiting Polyester filament mix fabrics)
P.T. Velveteen Indonesia.	Jakarta	Cotton flocked velveteen industry
P.T. Yang Textile Industries Ltd.	Jakarta	Integrated Textile Mill

Sources: Directorate-General of Textile Industry, Industry Sources.

bales¹ of yarn and 14,647,948 meters² of woven cloth at the following locations:

Function	Location	Equipment Origin
<i>Textile Mill</i>		
Senayan	Jakarta	Japan
<i>Spinning Mills</i>		
Cipadung	Bandung, W. Java	United Kingdom
Banjaran	Bandung, W. Java	China
Secang	Magelang, C. Java	United Kingdom
Lawang	Malang, E. Java	Japan
Crati	Pasuruan, E. Java	United Kingdom
Tohpati	Denpasar, Bali	Japan
Bekasi	Bekasi, W. Java	Italy
Palembang	Palembang, S. Sumatra	Germany
<i>Weaving Mills</i>		
Madurateks	Kamal, Madura	Japan
Makeateks	Ujung Pandang, S. Sulawesi	Japan

P.N. Sandang's expansion plans between 1976-80 include the addition of 30,000 spindles each at the Secang, Lawang, and Banjaran spinning mills. The Banjaran expansion will include installation of weaving facilities; the addition of finishing operations is being considered.

Though Japanese equipment presently predominates, P.N. Sandang is looking to Europe for future purchases. The State corporation's management is responsible to the Directorate-General of Textile Industry of the Department of Industry.

P.T. Inbritex, (Indonesian British Textiles), Pasuruan, East Java, was founded before World War II as a joint British-Dutch venture. During the war the Japanese operated and expanded the plant using machinery from Japan. In 1948 the original owners resumed operations and remained until nationalization in 1964. Production and quality deteriorated under ineffective management, and in 1968 the British partners of the original venture Calico Printers Associates, were invited to participate in a joint venture with the Indonesian Government.

In 1971 the company expanded with secondhand British equipment purchased in Australia. Present equipment consists of 40,000 spindles which produce 12,000 bales of cotton yarn annually, and 456 looms which produce unbleached muslin. Much of the output is used for flour sacks and funeral shrouds. In 1974 P.T. Inbritex began importing polyester sewing thread in bulk from the United Kingdom, Hong Kong, and Manila, for dyeing and rewinding on spools of various sizes for commercial and home use. All production is for local consumption.

P.T. Inbritex is trying to develop a quality denim for local jeans manufacturers; but along with other

weaving firms, it is having difficulty meeting the high dyeing and weaving specifications. Plans are under consideration for expansion into weaving fine count cottons and cotton/polyester blends, and spinning polyester thread.

P.T. Jogjatex, Jogjakarta, is a corporately owned, domestic operation which began in 1970. As an approved domestic investment project, it obtained a government loan, facilities for the import of machinery and raw materials on a duty-free basis, and a 3- to 5-year tax holiday. The factory has 27 units of 58-inch warp knitting machines that are rapable of producing 415,000 meters per month. In 1976 the actual monthly production using 200 workers on 4 shifts was 277,000 meters, all for domestic use. Presently 70 to 80% of the output goes to the local outlets, but in the future Jogjatex hopes to sell directly to garment manufacturers. All material is polyester with filament coming from Taiwan but texturized in Jakarta. The integrated plant includes dyeing and finishing equipment including jet, beam, and rinse dyers, and a German Artos Stenter finishing machine. Future plans are for increasing capacity, expanding into printing and texturing.

P.T. Textra, Jakarta, is managed by its founder and owner, began in 1960 as a weaving operation with 45 power looms from Japan. These were the first automated looms in Indonesia. In 1963, 250 Chinese looms were added. As obtaining quality thread became increasingly difficult, the firm moved into spinning. In 1967 the first attempts were made at spinning, with full production achieved in 1974. The present operation is a highly automated plant employing a Closed Automatic System. The plant runs 3 shifts a day, 7 days a week and produces 3,000 bales a month of top quality cotton yarn. To keep pace with customer demand, the firm plans to triple the present plant capacity of 30,000 spindles in 1977, with the addition of 30,000 cotton spindles and 36,000 polyester spindles.

Batik

Traditional Indonesian textiles include woven design materials and batik. Batik is hand-printed fabric made by alternating applications of wax and dyes to produce geometric, floral, and animal designs on cotton cloth. It is used for sarongs and other items of dress. Experimentation with new techniques and designs has resulted in batik of silk, heavyweight upholstery material, voile, and synthetics which are adaptable for a variety of fashion and decorative uses. Some manufacturers have begun making batik of knitted fabrics.

The batik industry, along with hand-loomed materials production, suffered from the development of modern textile production and the import of cheap textiles. However, there has been a revival in re-

¹ One bale is equal to 400 pounds net weight.

² Indonesian textile production is reported in linear meters, regardless of width.

cent years spurred by growing exports and domestic popularity of nontraditional batik clothing such as shirts and dresses. While boutique designers have long made batik fashion garments for limited domestic and export markets, a number of firms have begun large scale batik garment production.

The Government has assisted in organizing promotional events in major overseas markets to stimulate exports of garments, traditional batik, and batik design materials. It is interested in the batik industry because it has employment potential.

Leading business groups include Batik Keris and Batik Semar of Surakarta, Central Java, and the Jakarta-based Association of Indonesian Batik Cooperatives (GKBI). Batik Keris has been particularly active in the development of new batik methods and application and export marketing. While batik production in the mid-1970's represented only about 5% of total textile production, it plays a significant part in the Indonesian textile industry.

Garment Manufacturing.—The garment industry grew in the mid-1970's with 18 larger firms and 200 plus smaller manufacturers producing everything from plain cotton underwear to high fashion batik creations.

The largest producer is the Jakarta firm P.T. Like-spring, the Indonesian licensee for the U.S. firm Manhattan shirts. At full capacity this plant will produce 7.2 million garments annually and employ 500 workers.

Other apparel firms are planning considerable expansion within the next few years, with concern for quality control. One firm whose present capacity is 420,000 garments per month is projecting 1.8 million per month within the decade. Another company with 250 workers and \$100,000 in equipment in 1976 is looking to 3,000 workers and 2,000 sewing machines plus cutters and trimmers by 1979.

Denim garments have become extremely popular, although most production has been on a small scale. In mid-1976, Levi Strauss was reportedly investigating the possibility of opening a garment factory.

Batik Keris and others have launched extensive fashion presentations geared primarily toward the export market. While most garment manufacturers have given consideration to exporting, export production has not been a major concern as the growing domestic market offers considerable potential.

Footwear

The major manufacturer of shoes is Bata N.V. Perusahaan Sepatu (Bata Shoe Manufacturing Company). Its two plants, in Jatinegara, Jakarta and in Medan, North Sumatra, employ over 3,000 people and produce over 5 million pairs of shoes per year. P.T. Uniroyal, the U.S. Rubber subsidiary, at its

plantation site in North Sumatra is exporting 50,000 pairs of rubber sandals per month. The army operates its own factories which supply the majority of military footwear needs.

The shoe manufacturing industry also includes some 50 smaller firms with over 50 workers each, plus an additional few hundred workers at the cottage industry level. These firms produce primarily leather sandals. Any major growth in leather goods manufacturing is dependent on increases in the meat processing industry where projections do not show large gains in the next few years.

Sundries

A few firms have begun production of zippers, elastic, and other notions, but the garment industry still imports the bulk of such items in order to meet quality requirements.

PRINCIPAL GOVERNMENT OFFICES

The Directorate General of Textile Industry, Jalan K. H. Hasyim Asyhari, No. 6-12, Jakarta, in the Department of Industry has three directorates: Spinning and Weaving Industry, Knitting Industry, and Garment Industry. The Directorate-General is responsible for developing the textile industry and supervising the operations of the State textile enterprises.

The Directorate-General also is responsible for influencing government policy which affects the textile industry in a number of major ways, including issuance of manufacturing licenses, regulation of imports and labor, and through the operation of the State textile enterprises. Selective import duties and regulations on particular raw materials, machinery, and finished products are used to protect segments of the industry. The Government uses tax relief and other incentives in connection with the approval of foreign and domestic capital investment projects to stimulate development of the industry. Additionally, the entire industry is affected by the planning, expansion and procurement which the Government undertakes through the State enterprises.

Two other government offices affect the textile industry. The Directorate-General of Light Industry and Handicrafts of the Department of Industry supervises and regulates the manufacture of specialty items classified as handicraft. Because the textile sector is a main target for increased employment, the Department of Manpower, Transmigration, and Cooperatives through the Directorate-General of Manpower Promotion and Recruitment and the Directorate-General of Labor Protection and Maintenance monitors labor practices. Factory workers are on trial for 3 months, and if employed beyond that period dismissal becomes a very difficult and lengthy process.

ture. Though firms are allowed to automate, they are not allowed to reduce their labor force in the process.

Trends and Programs

In the 1930's the Dutch began a two-point program to industrialize what had been a cottage industry and to decrease imports, in order to protect new Dutch investments.

Mechanization came in 1937 with long, narrow sarong looms, many of which are still in use. Looms for inexpensive cloth came from Japan while those for finer grades of material came from Germany.

World War II left the textile industry virtually ignored and growth remained static until after the Independence struggle in 1950, when textiles were chosen by the Government as a target industry for development. By mid-1950, industry growth was hampered by weak finances, inexperience in management and technology, and increasing labor movement agitation for higher wages and job security. However, it was also in that period that the traditional men's sarong began to be replaced by trousers, and new impetus was given to the textile industry.

In the late 1960's a boom in the field developed as changed government priorities focused attention on textiles, increased foreign exchange made funds available for expansion, and polyesters made their appearance within the industry. Since then there has been continued growth both in quality and in the variety of goods produced.

Initially Indonesian textile production primarily involved the basic processes of spinning and weaving; however, simple operations have evolved both vertically and horizontally. The policy of the Government has been to support the concept of the integrated mill, so that many firms which started as weavers are expanding in both directions, into spinning and into finishing; spinners are becoming involved in fiber production; weavers are moving into finishing and printing, with knitters expanding into garment manufacturing. However, many private firms prefer to concentrate expertise in one field and have focused their expansion within a single area. To maintain a technological edge in this highly competi-

tive field, private owners often maintain a high degree of security concerning new equipment and processes.

The world recession hit the Indonesian textile market in 1974 seriously affecting new investments, and many approved applications were never actualized. The difficulties continued through 1975 and early 1976. Some of the older mills are still depressed and operating at low output, but by mid-1976 those who have modernized were operating close to capacity and had optimistic plans for continued growth.

Smuggling of textiles has long been prevalent in Indonesia with large amounts entering illegally; the flow of contraband textiles reached unprecedented levels beginning in 1974. Textile manufacturers put serious pressure on the Government, and in the spring of 1976 a strict antismuggling campaign was initiated. Greeted at first with skepticism, it appeared, at least in the short run, to have been fairly successful with fewer such goods appearing on the market and domestic sales increasing.

The Government has made the statement that it "regards clothing as second only to rice in the Indonesian economy" and has supported growth of the sector with tax incentives and credit allowances. During the first 5-year development plan 1969-70, textiles was one of the few industries which exceeded annual targets, with yarn production increasing 87% and textile output multiplying 100% (table 3). From 1969 to 1971 textile and clothing production exceeded projections, and the increasing variety and improved quality of domestic production caused imports of high quality yardage to level off.

In the second 5-year development plan (1974/75-1978/79 (Repelita II), the Government states that the "textile industry has the major role in the development of the industrial sector" and that "measurements to expand the textile industry will be vigorously pursued in the coming 5 years." Projections call for a 39% increase in textile production and a 90% increase in yarn production. Established goals are to, provide clothing, to increase employment, and to replace imported goods with domestic production.

The target of increasing employment remains a problem as firms face the difficulty of wanting to au-

Table 3.—Indonesia: Textile and Wearing Apparel, Production and Import Figures

	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79
Textiles: (millions of meters)										
Production	450	598	732	852	920	930	990	1,100	1,250	1,400
Imports	283	259	364	309	300	360	356	320	260	200
Weaving Yarn: (thousands of bales ¹)										
Production	182	218	239	278	360	486	541	621	746	898
Imports	167	246	308	357	334	220	181	151	85	20

¹ One bale equals 400 pounds net weight.

Source: Directorate-General of Textile Industry.

tomate in order to achieve increased quality and volume, while not being allowed to lay off workers. Since garment manufacturing does not require large capital investment and is labor intensive, the industry is looking to growth of garment production to absorb large numbers of additional workers. To stimulate continued expansion of garment manufacturing the Government has encouraged garment manufacturers to locate in duty-free bonded export processing zones.

Investors and plant management must consider the Government's policy to extend more liberal terms for new investment than for expansion and rehabilitation. New investments are eligible for tax breaks on both facilities and raw materials, while modernization and expansion projects receive tax-free periods on facilities only. For this reason some firms are considering expansion toward an integrated operation involving the investment in new facilities rather than specializing in one operation and investing in plant expansion. Others have handled expansions by establishing separate new companies in order to qualify for the broader tax incentives.

An additional factor related to new investment is the government decision made in 1974 to close Java to new facilities. This was done because of the high concentration of the textile industry on that island and to increase employment opportunities in other regions. The Government also has instituted restrictive regulations on the production of certain types

of fabrics in order to maintain a balance in the domestic market.

The batik industry has revived in recent years with considerable interest centered in exports. The industry has grown steadily in the mid-1970's, but still accounts for less than 5% of textile production. However, the makers of textiles presently thought of as handicraft, such as batik and embroidered goods, are turning their attention to mass-production of fashion garments, and are looking for significant increases in sales and exports before the end of 1979.

INDUSTRY GROWTH PROSPECTS

Based on the Government's interest in the textile industry, qualitative and quantitative expansion planned by the industry, rising income levels, and changing clothing styles, textile manufacturing is predicted to expand steadily. Recovery from the 1974 slump has begun, and economists predict that 1977 should find the industry stabilized and looking forward to continued expansion. Increased domestic textile sales and the initiation of industry expansion plans are positive signs that the industry's recovery is on target.

Between 1967 and 1974 approvals were granted to 64 foreign investment projects worth \$705.9 million. In 1975 and the first quarter of 1976, applications were filed for 15 additional foreign investment projects valued at \$118.7 million (table 4). Also filed

Table 4.—Indonesia: Textile and Apparel Industry, Foreign Investment Applications, 1975–76¹
(Millions of U.S. dollars)

Firm	Foreign Investor	Location	Partnership Arrangement	Capital Investment	Production
Bharat Commerce & Industries Ltd. .	India	n.a.	Joint with Mr. Mohanlal	\$ 27.0	Mfg. of viscose staple fibres
Sima Viscose Co.	Italy				
Internat. Textile Corp.	Bermuda				
Great Malaysian Textile Manufacturing Co., Pvt. Ltd.	Singapore	Greater Jakarta	Joint with P.T. Perintis Textile Industries	1.9	Garment industry for export
Bharat Commerce & Industries Ltd. .	India	Surabaya	Joint with Mr. Mohanlal	5.0	Spinning plant
Century Rayon Associated Sales & Investment Corp.	India Hong Kong	Jakarta	Joint with P.T. Bakti Indus. Development Corporation	8.4	Integrated textile mill
Karamchand Premchand Pyt.	India	Semarang	Joint with Mr. K.H. Sinivasan	6.0	Integrated textile mill
Tai Yuen Textile Co. Ltd.	Taiwan	Semarang	Joint with Surya Teja Indon.	16.8	Integrated textile mill
Glory Shoe Company	Ghana	Jakarta	Joint with Mr. Nico Tjahjadi	0.5	Elastic ribbons, tapes, and laces
J.P. Coats Ltd.	Scotland	W. Java	Joint with P.T. Tulus Rejo	10.1	Yarn industry
Chanrai Investment Corp. Ltd.	Bahamas	Jakarta	Joint with Mr. S. Roesminem	9.9	Integrated textile mill
Autumn Investment Ltd.	India	E. Java	Joint with C.V. Java Balitex	24.0	Spinning & weaving mill
Avon Manufacturing Co.	New Zealand	Surabaya	Joint with P.T. Dwi Satya Utama	1.1	Nylon and polyester slide fastener
The Cokak Mills Ltd.	India	Tangerang	Joint with P.T. Usaha	8.0	Spinning mill
Seamco	Swiss		Bangunan		
TOTAL FOREIGN INVESTMENT APPLICATIONS:				118.7	

¹ Through March 31, 1976.

Source: BKPM (Capital Investment Coordinating Board).

in 1975 and early 1976 were 33 domestic investment applications valued at \$150.3 million (table 5). These projects will lead to significant expenditures on new equipment as they are implemented.

The government priority to provide clothing and employment opportunities has created supportive regulations which are assisting growth in the textile industry. While these regulations have favored some segments of the industry over others, they have not hampered growth of the industry as a whole. The textile industry was one of the few sectors to exceed the first 5-year plan goals and is presently running ahead of revised second 5-year plan projections. A recent government publication contained the following statement:

"Textile production increased by more than 100% during the First Five-Year Plan (1969-74). Even with this significant growth, further expansion will be necessary to meet ever increasing demands. Per capita textile consumption is estimated at 9.5 meters—implying that 1.2 billion meters are needed to meet present market demands. This year's textile production is expected to be 430 million meters. In 1979 per capita consumption is expected to reach

11.5 meters and production to expand to 1.5 billion meters."

The move to increase the quality and variety of products should also spur growth within the industry. Domestically produced items are competing with and replacing imported goods.

Changing styles will have a major effect on the garment industry, and these influences will be reflected throughout the industry as weavers and spinners are challenged to produce the quality and variety needed by garment manufacturers.

Expansion of the educational system will cause an increased demand for mass-produced school uniforms as schooling becomes available to families who cannot afford tailor-made apparel. Uniforms are considered by some to be an ideal starting item for new garment manufacturers due to the need for large numbers of basic, loose-fitting garments.

Growing technology should increase quality and lower production costs so that well-made, competitively priced items are readily available for the domestic market and for export within the coming years.

Table 5.—Indonesia: Textile and Apparel Industry, Domestic Investment Applications, 1975-76¹

Firm	Location	Capital Investment (US\$ Million)	Production
P.T. Patal Sempurna	Jakarta	5.2	Spinning Mill
P.T. Gangga Suci Silk Industries Ltd.	Bandung	8.4	Integrated Textile Mill
P.T. Bell A Bell Textiles	Bandung	8.4	Integrated Textile Mill
P.T. Budi Rapih	Jogjakarta	0.4	Leather processing
P.T. Jabatek Ind.	Tangerang	8.0	Integrated Textile Mill
P.T. Bintang Agung, Ind.	Bandung	14.6	Fine woven textiles
P.T. Condro Purnomo Cipto Ind.	Semarang	0.3	Leather processing
P.T. Shinta Indah Jaya	Bandung	0.1	Textile Manufacturing
C.V. Langsung, Ind.	Bandung	6.9	Integrated Textile Mill
P.T. Minang Sutura	Padang	0.9	Synthetic Thread
P.T. South Bandung Textile Mills Ltd.	Bandung	1.2	Fine woven textiles
P.T. Markono Oriental Synthetic Textile Industry	Jakarta	7.9	Synthetic Textiles
CV. Firman Textile Mill Ind.	Bandung	6.6	Textile Manufacturing
P.T. Shinta Indah Jaya	Tangerang	0.8	Textile Manufacturing
P.T. Daliatex Kusuma	Bandung	6.3	Textile Manufacturing
P.T. Kencana Murni Baru	Sidoarjo	4.8	Dyeing and finishing
P.P.K. Djantra	Simongan	9.7	Textile Manufacturing
Perum Perhutani Ind.	Jawa Tengah & Timur	0.5	Textiles and thread
P.T. Metropolitan Synthetic Textile Chemical Ind.	Tangerang	1.2	Textile Manufacturing
P.T. Yersey Indonesia	Bandung	1.3	Textile Manufacturing
P.T. Wood Yamatex Ltd.	Padasuka, Bandung	3.6	Textile Manufacturing
P.T. Gunatex	Pekalongan	5.6	Textile Manufacturing
P.T. Minatex	Lawang Malang	22.3	Integrated Textile Mill
P.T. Delimatex	Bandung	0.6	Textile Manufacturing
CV. Gunawan	Bandung	2.9	Textile Manufacturing
CV. Bajatex	Bandung	3.0	Textile Manufacturing
CV. Ramayana Textile Mill	Bandung	1.8	Textile Manufacturing
P.T. National Label Umas Daya	Jakarta	0.3	Textile Manufacturing
P.T. Perintis Textile Industry	Bandung	6.6	Textile Manufacturing
P.T. Gunnung Kidul	Cimahi	1.2	Textile Manufacturing
P.T. Batik Keris	Solo	3.5	Textile Manufacturing
P.T. Industri Sandang Simpang	Purbolinggo	0.4	Textile Manufacturing
P.T. Naintex Dua	Bandung	5.0	Textile Manufacturing
TOTAL DOMESTIC APPLICATIONS:		\$150.3	

¹ Through March 31, 1976.

Source: BKPM (Capital Investment Coordinating Board).

MARKET SIZE

The total market for textile equipment and machinery in 1975 reached \$137.1 million (see table 6) up only 15% from the previous year. Between 1973 and 1974, during the height of the expansion, equipment purchases rose from \$89 million to \$119 million, a 34% increase. Based on examination of official trade statistics, expansion plans and trade source interviews, sales are projected to reach \$265 million in 1980 representing an annual compounded rate of growth of about 14% per year during the 1975-80 period. All major equipment will continue to be imported through 1980.

Table 6.—Indonesia: Size of Import Market for Textile and Apparel Manufacturing Equipment
(thousands of U.S. dollars)

	1973	1974	1975	1976	1980
SPINNING MILL EQUIPMENT					
United States	470	4,710	2,900	3,800	6,500
Japan	23,953	34,310	47,835	—	—
Switzerland	1,914	1,814	2,000	—	—
United Kingdom	1,749	942	1,000	—	—
West Germany	1,516	6,686	4,000	—	—
Taiwan	700	800	900	—	—
Others	1,000	1,100	1,200	—	—
TOTAL	31,302	50,362	59,835	—	—
TOTAL MARKET	31,302	50,362	59,835	76,000	129,800
TEXTILE AND FABRIC PRODUCTION EQUIPMENT					
United States	3,400	2,300	400	3,900	4,100
Japan	15,000	17,000	28,000	—	—
West Germany	9,000	8,300	9,000	—	—
Netherlands	950	1,360	1,300	—	—
France	800	2,400	2,500	—	—
Switzerland	130	710	800	—	—
Others	9,220	9,130	10,000	—	—
TOTAL	38,500	41,200	52,000	—	—
TOTAL MARKET	38,500	41,200	52,000	59,900	82,800
TEXTILE AND FABRIC FINISHING EQUIPMENT					
United States	2,300	2,200	1,000	1,200	1,750
Japan	9,900	12,000	6,000	—	—
West Germany	1,800	2,000	4,000	—	—
United Kingdom	600	1,400	2,000	—	—
Switzerland	300	1,200	2,500	—	—
Singapore	300	400	500	—	—
Others	2,800	5,100	2,000	—	—
TOTAL	18,000	24,300	18,000	—	—
TOTAL MARKET	18,000	24,300	18,000	21,000	35,000
APPAREL AND OTHER TEXTILE PRODUCTS MANUFACTURING EQUIPMENT¹					
United States	50	160	200	260	900
Japan	1,400	2,800	5,900	—	—
West Germany	140	200	300	—	—
Singapore	180	150	140	—	—
Taiwan	200	350	630	—	—
Italy	10	40	60	—	—
Others	20	30	70	—	—
TOTAL	2,000	3,730	7,300	8,800	18,100
TOTAL MARKET	2,000	3,730	7,300	8,800	18,100
TOTAL MARKET SIZE ...	89,802	119,592	137,135	165,700	265,700

¹ Includes sewing machines, leather working machinery, and other garment and footwear manufacturing equipment.

Source: Official Indonesian and supplier statistics, and estimates based on trade source interviews.

In the early years of the first development plan, emphasis was on increased output, during the current national plan period emphasis is on quality. This shift has been reflected in an increased interest in close tolerance equipment from Europe.

Imports

The Indonesian textile industry is heavily dependent on imports for both machinery and raw materials. Not only is 99% of all cotton imported, but in 1975 over half of the cotton weaving yarn required for weaving operations was imported. Textiles and polyester fibers are also imported as is virtually all machinery and 96% of the necessary spare parts. Moves towards self-sufficiency, and application of more advanced technology and improved product quality are expected to cut imports of raw materials and finished textile goods. However, Indonesia will continue to be dependent upon imports of textile equipment and machinery for the foreseeable future.

Japanese suppliers led equipment sales in the 1960's because of low prices, easy financing, and their willingness to undertake turnkey plant contracts. Present concern for increased plant efficiency and the move toward increased product quality is expected to cut into the Japanese share with German, United Kingdom, and Swiss manufacturers picking up many new and replacement sales. The market share of U.S. suppliers in 1975 was only 4%, and if the present trend continues, it is not expected to rise above 5% by 1980.

Spinning mill equipment imports were valued at \$59.8 million in 1975; by 1980 such imports are expected to reach \$129.8 million. Japanese firms in 1975 were the leading suppliers of spinning mill equipment, with a 79% market share. However, buyer dissatisfaction with equipment reliability should cut Japanese sales to less than 50% with German, Swiss, and British sales picking up.

Textile and fabric production equipment sales reached \$52 million in 1975. By 1980 total sales could reach \$82.8 million. Japanese manufacturers led in sales with 54% of the market, followed by West German firms with 17%. Due to heavy expansion in the production of knitted fabrics and the requirement for technical excellence and quality control, by 1980 West German companies are expected to take more than 35% of the market, with Japanese suppliers experiencing a corresponding decline in sales.

With the exception of 1974, imports of textile finishing equipment remained fairly stable with approximately \$18 million in annual sales. Demand for greater variety and higher quality in products is expected to generate considerable increased sales so that by 1980, imports could go as high as \$35 mil-

lion. With 33% of the market, Japanese manufacturers in 1975 led in sales of finishing equipment, followed by West German and Swiss firms with 22% and 14%, respectively. By 1980 German manufacturers are expected to take the lead with the share of Japanese suppliers dropping.

During 1973-75 imports of apparel and other textile products manufacturing equipment grew from \$2 million to \$7.3 million, and by 1980 they are expected to reach \$18.1 million. Japanese firms have led in this field with an 80% market share. However, West Germany manufacturers are expected to increase sales by 1980 with their high quality machinery while Taiwanese and Chinese firms will make inroads in sales of less advanced equipment.

Domestic Manufacturing

Although the second 5-year development plan stresses domestic production of textile machinery and equipment, domestic production so far has been limited to plastic spools, minor hardware, hand looms, and sewing machines. Industry sources believe that the increasing level of technology required by the industry precludes any significant advance in the foreseeable future.

Sewing Machines.—Domestic sewing-machine production in 1975 was 400,000 units, but local demand did not exceed 300,000 units. There are five sewing machine factories and three assembly plants, but most of them are operating below capacity due to low consumer purchasing power. The manufacturing plants are: P.T. Golden Pharos, East Java; P.T. Alam Raya, P.T. Madone, and P.T. Indo Machine, all of Jakarta; and P.T. Singer Industries Indonesia Ltd. the only foreign investment venture, with plants in Surabaya, East Java. The assembly plants are P.T. International, Medan, North Sumatra, and P.T. Ningz International, and P.T. Pegasus International both of Jakarta.

P.T. Singer Industries Indonesia Ltd., a subsidiary of Singer, Inc. (U.S.), began operations in 1956 with an assembly plant in Surabaya, East Java. In 1975 a new manufacturing facility was established in nearby Waru. Initial production was 30,000 units with annual capacity estimated at 50,000 units. The factory employs 170 workers. Only the cabinets are presently manufactured by Singer plants, and components are imported.

MARKET OPPORTUNITIES

A growing market is projected for all types of equipment from spinning to finishing and garment manufacturing. Industry attention will be focused on efficiency in operation, durability and quality control. Some industry spokesmen maintain that present fas-

cination with polyesters will be followed in a few years by a renewed interest in high-quality cottons and cotton/polyester blends. Specific fields with market potential are:

Polyester spinning equipment.—Though government figures indicate progress toward the goal of obtaining a balance between the number of spindles and the number of looms, many of the spindles in existence are either nonoperational or idle cotton producers. In order to fulfill the needs of the growing, high output polyester knitting mills, new spindles will be required. Sales of high-quality imported polyesters reflect growing consumer interest. Government priorities on self-sufficiency should decrease imports and provide encouragement of domestic production of fine grade synthetic goods.

Knitting machines, (particularly flat knitting machines with both set and variable stitch control).—Lace is an important part of women's dress in Indonesia and the market for both low- and high-priced laces should continue for several years. Consumer demand for polyester knits, lace, and other knitted materials will sustain increased sales of knitting machines.

Finishing, printing, and dyeing equipment.—Customer interest in textile variety and the demands of garment manufacturers will generate sales of finishing, printing, and dyeing equipment. Many sales will be to moderate-size facilities where the addition of one or two pieces of equipment will add flexibility to the existing operation.

Testing machinery.—As quality is becoming a prime factor in textile production, requirements for manual and automatic testing equipment will increase. Such equipment will include on-line quality control and defect detection devices, as well as complete laboratory testing systems.

Garment manufacturing equipment.—Planned and projected growth of garment production should spur sales of basic sewing machines and cutting and trimming machines. Since garment operations can begin with a relatively low capital investment, this field is attracting the interest of new investors, as well as those presently engaged in other facets of the textile industry. Many existing garment makers also have expansion plans.

Production of sundries.—The growing garment industry, the low output and/or poor quality of present production, and the availability of raw materials make the production of elastics, buttons, zippers, etc., a field likely to expand.

Air-conditioning and climate control equipment.—The increasing use of advanced, sensitive textile equipment to produce quality synthetic fabrics and concern for higher production and efficiency is requiring textile manufacturers to install air-conditioning and climate control equipment in their plants.

Professional services.—Technical assistance is necessary, primarily in garment production. Though some fine quality boutique fashions are appearing and shirts are being mass produced, the general quality of workmanship needs improving. There is need for expertise in this field, particularly in the intricacies of knitwear manufacturing, and in production management and marketing.

IMPORT PROCUREMENT

Buyers' Universe

There are three market segments in the textile industry: (1) firms with government ownership, (2) foreign investments and joint ventures, and (3) private domestic firms.

Expansion and replacement plans for government firms are drawn up by the Department of Textiles, though equipment requirements and requests for specific brands and model numbers are often placed by the plant director. It is therefore necessary to study the Government's long-range expansion plans for the textile industry and to make direct sales approaches to the managing offices of P.N. Industri Sandang (Jl. Menteng Raya 7, Jakarta) and to the director of the plant due for expansion.

Government-foreign partnerships have somewhat more autonomy although long-range planning is under the jurisdiction of the Department of Textiles.

Expansion plans are often initiated by the foreign partner; purchase decisions often require clearance and frequently are made by the home office of the overseas partner. In approaching such firms, it is necessary to ascertain the Government's long-range plans as well as to directly approach company management in Indonesia, and the foreign home office.

Private domestic-foreign joint ventures do their own planning. Purchase decisions are sometimes delayed pending confirmation by both partners. Sales approaches should be made to the management in Indonesia as well as to the home office of the foreign partner.

Many of the private domestically owned plants are run by owner-managers; decisions for planning and purchasing are directly in their hands. The owners of these firms have often developed detailed expansion plans and focus closely on equipment capabilities in making purchase decisions. Marketing thus requires a direct and personal approach directed at the individual firm management.

Foreign Suppliers Universe

Approximately 20 manufacturers located in Japan, The Netherlands, Switzerland, and Germany supply a large part of the textile machinery and related equipment purchased in Indonesia. The remainder comes primarily from firms in Taiwan, and the United States, with an increasing amount being supplied from China (see table 7).

Table 7.—Indonesia: Leading Suppliers of Textile Machinery

<i>U.S.A.</i>	<i>Italy</i>	<i>Japan</i>	<i>West Germany</i>	<i>Switzerland</i>
Union Special	Nuova San Siorgio	Jukii	Karl Mayer	Rieter AG
Curtis and Marble	Cognetex	Yamato	Ko-Tex	Truetsler Carding
Leesona Corporation	Tematex	"Dsk"	Passat	Luwa
Rockwell International	Officine Savio	Susei	Emil Adolff	
Dayco Corporation	Officine Dalieo	Mitsubishi	Artos Stenter	
CSI International	Carlo Diani	Brother	Zinser	
H. Molson	Mezzera		Rieter	
Singer	Carniti O. Engines			
Ellison	Arlohl Company, S.R.L.			
	Mecmor S.P.A.			
	Italtubetti			
	Rosique			
<i>United Kingdom</i>	<i>Hong Kong</i>	<i>Belgium</i>	<i>Australia</i>	
Aspinall	Sunny Industrial Co. Ltd.	Prayon de Pouw, S.A.	Kemtex Pty. Ltd.	
EGK		Verbrugge Freres		
Texon				
Platt Saco Lowell				
Camber International				
How Group Ltd.				
Hall and Kay Engineering Ltd.				
Dronsfield Brothers				
Trumeter				
Frank Knowells and Co., Ltd.				
Haigh and Gill, Ltd.				
T. Lund and Sons, Ltd.				
Foulds and Sons Ltd.				
Casablanca Ltd.				
Cook Ltd.				

Source: Trade sources.

Throughout the industry there is unanimous agreement on the technical excellence of German and Swiss machinery, such as Zinser spinning frames, Truetsler carding machines and Rieter open-end spinning system. Swiss dyeing machinery is also rated highly due to its extremely close tolerances in dye lot reproduction and even color distribution. (Sales figures indicate that these quality considerations outweigh cost factors.) The high regard extends to Swiss and German sales engineering, installation, and after-sales service. Industry sources state that installation is well supervised, and in the case of complex equipment, a technician remains with the local firm until the machinery is running smoothly, and operators and maintenance people are adequately trained. If difficulties arise later, assistance is always made available. Spare parts are easily obtained from stock which German and Swiss suppliers have located in Indonesia and backed up in either Singapore or Hong Kong. Financing is supported by the German Government and readily available to stable firms; terms for major purchases are usually 5 years.

Luwa Engineering of Switzerland has made significant increases in the sales of expensive air filtering and climate control equipment by demonstrating the long-term savings accrued from increased efficiency of workers, lowered maintenance costs for machinery, and recovery of reusable raw materials. Luwa Engineering will guaranty to each company the time in which accumulated savings will recover the cost of installing the system, and has always been able to outperform the guarantee.

Japanese equipment was purchased frequently during the early 1970's when the first priority was to get into production quickly. Operating on a minimum of capital, many plant owners were attracted by the low prices and easy financing of Japanese made machines. Fast delivery was a factor as was the dedication and attention of sales personnel. In addition, Japanese suppliers assured supplies of raw material at guaranteed prices. The plus factors in price, credit, fast delivery, and attentive service are still true today, however, there is growing dissatisfaction with the durability of the machines and with the quality of the final product.

Quality has been found to be the most effective competition to Japanese prices, as has been demonstrated by Singer, Inc. (U.S.). Though Singer sewing machines are made primarily for home use and are more expensive than machines from Japan, China, and Taiwan, their capabilities and durability have allowed them to compete with higher priced industrial machines such as the Japanese Brother line for use in garment manufacturing.

Sales of equipment from Taiwan is increasing. Taiwanese equipment is competitive with European

equipment in price and often in quality. Because of its newness in the market, it has yet to prove its durability. Machinery purchased from China consists primarily of simple power looms and spinning equipment. They are considered durable and dependable and are often the choice of medium-size producers of basic yardage whose prime considerations are obtaining increased production capacity and low prices.

MARKETING FACTORS

Most suppliers have permanent representatives in Indonesia. There are 27 agents registered as importers of textile equipment with one agent often representing several lines of equipment. Many manufacturers, including most Europeans, have regional offices in Singapore or Hong Kong.

Price and financing have been the major consideration in textile machinery purchases, but the present trend emphasizes technical and performance capabilities.

Successful suppliers have ensured that credit is readily available at reasonable terms, usually relying on government export credit facilities. Often the buyers most interested in quality equipment have the financial resources and reliability to qualify for the best credit terms. There have been instances when the end user preferred and signed for tighter terms than the manufacturer was offering.

Manufacturers from Germany, Switzerland, and Japan offer liberal credit arrangements and work with the customer in arranging financing. One Swiss textile equipment manufacturer has financed a \$150,000 credit for 3 years and a \$250,000 credit for 5 years. French firms are able to effectively use the liberal French export credit program, and are often able to accept a personal guarantee in cases where a guarantee is required. Manufacturers from the United Kingdom ask for financial statements and in the case of a small firm might ask for a guarantor before extending credit, but are often willing to accept the guarantee of a company from the same corporate group.

Agents say that equipment from the United States, often exceeding competitive offerings in quality and price, meets sales resistance due to the inability of manufacturers to offer satisfactory credit terms. Two Indonesian firms purchased polyester fiber from a U.S. supplier that was both price and quality competitive with Japanese fiber. However, they changed to another supplier when the U.S. firm refused to extend them a line of credit for future purchases. One successful U.S. supplier is Tubular Textile Machinery Company which assists in financing purchases of its knitwear finishing machines. It relies on a firm's trade

references which in Indonesia often are more informative than bank references and financial statements.

Most companies that have expansion plans know what types of equipment they want and have preliminary purchase schedules. Some plans call for step-by-step replacement while others are looking to major overhaul or expansion.

Purchasing offices in both private and State firms do comparison shop, looking at several lines of equipment before purchasing. Four factors are weighed before the final selection: technical capabilities, total cost, financing, and installation and after-sales service, which include applications engineering, training, installation, spare parts, and service. In the earlier years of fast growth within the industry, purchase price was the single most important factor, while in recent years the emphasis is shifting to technical capabilities. This shift is based both on growing expertise within the sector and therefore the demand for machines of greater capabilities, and also on the growing disillusionment with previously purchased inexpensive equipment.

European firms have found ways to speed up delivery times to compete with Asian producers. Many keep spare parts and stocks in Indonesia, Singapore, and Hong Kong to provide ready service. When a part is not available from sources in Asia, it is flown in from Europe or Japan, often at the manufacturers' expense. Delivery times from the United States are long, but generally not the major difficulty facing American suppliers.

Buyers expect considerable technical service as a part of the sales process. This includes presale consulting services, supervision of installation, and training for local operators and maintenance personnel. The most successful sales approach involves time and continued presence during which a relationship evolves. Suppliers need to become acquainted with needs of potential customers, and be willing to work with them over the long range to expand production capabilities. One supplier who is in the process of closing a multimillion dollar agreement noted that he began working with this particular customer several years ago when he had less than 50 looms.

Many industry executives have studied abroad or traveled as part of trade or industrial research teams. They are personally acquainted with the major suppliers and manufacturers overseas and maintain these contacts to keep abreast of new developments. They also read technical trade journals from Europe and Asia such as *Textile Asia*, published in Hong Kong and the *International Textile Bulletin* from Switzerland, and attend shows like the quadrennial International Textile Machinery Exhibition (ITME). Several large purchases including entire systems, were reported from the shows in 1967, 1971, and 1975.

There are a number of organizations and lobbying groups active in the textile sector. Numerically they represent a small portion of the industry. Some of the most powerful and successful firms say they do not have the time or need for these groups. However, some groups are working seriously to increase their influence on government decisions and on self-regulation within the industry. The Textile Club (Jl. Gen. Gatot Subroto Kav. 8, Jakarta), which reportedly represents less than 5% of the textile manufacturers and is controlled by Japanese firms, completed an extensive survey of the textile industry in mid-1976. Their findings, which are available through the Director General of Textile Industry formed the basis for several protective recommendations which they have proposed to the Government. The Garment Manufacturers Association (c/o P.T. Likespring, Jl Raya Bekasi, Kemayoran 21, Jakarta), although only slightly more than 1 year old, counts 17 of the most influential garment makers among its members. Its major concerns are protecting quality within the industry and attempting to create a climate favorable to garment export.

Perserikatan Perusahaan Tekstil Seluruh Indonesia, (Perteksi, the association of all Indonesia textile enterprises, Jl. Petojo Utara 20, Kotak Pos 100, Jakarta), whose members are all "pribumi" (indigenous Indonesian) textile manufacturers, seeks favored status for indigenous textile industries. In mid-1976, a Spinners Association (c/o Moj Gen Marjadi, P.N. Industri Sandang, Jl. Mentenga Raya 7, Jakarta) began, and there is a report of the founding of P.I.B.T.I. (a ready-made textile goods association) whose major project, "Garment Week," was held in April 1976. The association of Indonesian Synthetic Fibre Producers (APSYFI) (c/o Bara Muli Sh, Wisma Nusantara Bldg., Jakarta) is actively involved in a campaign to close the industry to additional outside investment.

COMPETITIVE POSITION OF U.S. SUPPLIERS

The rapidly growing Indonesian textile industry offers excellent opportunities for sales of U.S. equipment. In some instances, American suppliers will have to overcome a reputation for indifference to the Indonesian textile equipment market. They will have to develop a much more active and accommodating marketing approach in order to meet competition from firms offering a wide range of available technology, liberal financing, short delivery terms, and extensive pre- and post-sales service.

Commenting on the approach of U.S. firms to the textile industry in Indonesia, one businessman said: "They never come around to talk with us. I have

never had any one try to sell me equipment." Others noted what they interpreted as a sense of arrogance on the part of American machinery manufacturers. One plant manager, speaking of after-sales service summed it up as "Nonexistent," indicating that his firm was one of the first users of U.S. textile equipment in Indonesia.

Competitive financing is also essential in developing this market. Trade sources consistently noted that American textile equipment firms are handicapped because they do not seem willing to help arrange financing for their clients.

U.S. equipment and technology have strong competitive capabilities in production and spinning of petrochemical fibers. U.S. garment manufacturing machinery, especially for fine quality knitwear, also has excellent sales prospects. With the move toward domestically produced raw fiber, factories will require production and testing equipment in a field where the United States has a technological lead and experience. Several owners, who recently expanded or are expanding into knitting, expressed an interest in moving into garment manufacturing. They mentioned the difficulties involved in producing quality items, and indicated they would welcome contacts with U.S. firms who had experience in this field.

Trade sources indicate that exhibitions, seminars, and sales presentations which offer technical informa-

tion and exposure to new equipment and the opportunity to see it perform would receive an excellent reception. One possible sales approach would be installation of a demonstration garmentmaking line including all the necessary equipment in combination with presentations on high-quality production management.

Advertising in trade magazines and by direct mail would provide an effective initial approach to buyers. U.S. textile equipment trade journals are not widely circulated in Indonesia, but would constitute an excellent media for stimulating interest in U.S. equipment if manufacturers, trade associations and publishers introduced them into the market. Advertising should emphasize the technical capabilities of equipment from manufacturers in the United States, and the availability of applications engineering, after-sales service, and financing. Of course, responses to such advertising should be answered promptly and thoroughly, and followed-up by a personal visit from an authorized agent or company salesperson.

A firm interested in becoming involved in the Indonesian textile industry should consider sending a company executive to Indonesia for an extended period to familiarize himself with the market and develop the contacts. This would give the firm time to investigate, select, and develop a relationship with an agent.

Transportation

Transportation is a key element in Indonesia's development plans, and improvement of the transportation system is essential for the economic growth of the country.

Transportation development did not receive adequate attention during the first national development plan (Repelita I, 1969/70–1973/74), and transport systems are still hampered by old equipment and antiquated management methods. However, the Government recognized that advances in other industries have been restricted by transportation deficiencies, and programs are being designed to focus on those areas needing improvement.

During the second national development plan (Repelita II, 1974/75–1978/79), nearly \$2 billion was earmarked for transportation and communications, representing about 15.6% of total development expenditures projected for the 5-year plan period. Of this amount 39% will be channeled into construction, rehabilitation, improvement and maintenance of the nation's network of roads, bridges and highways. Planned outlays for improvement of the shipping and port network amount to about 31% of that total. Plans call for expansion in the capacity of both the inter-island and ocean-going fleets by about 50% each. Substantial public investments in the railway network are slated, representing nearly 8% of the transportation and communications 5-year budget. This is expected to lead to a substantial increase in the total freight carried by the railroads. Upgrading is planned for about 70 airfields, twice the number developed during the previous 5-year period, and air passenger capacity is expected to double. During the current national plan, special emphasis is being placed on the improvement of communications with the remote areas of the country; many of which are developing very rapidly. Transportation development is the responsibility of the Department of Communications (Jl. Medan Merdeka Barat, 8, Jakarta).

Sales of transportation equipment in 1976 are estimated at \$696 million for road transport equipment, \$75 million for marine transport equipment, \$81 million for air transport equipment, and \$9 million for rail transport equipment.

The Government has requested international assistance in the development of the country's transpor-

tation system, and both international organizations and foreign governments are providing support for transportation expansion projects. Private, domestic transport firms are also expected to purchase substantial amounts of equipment. Considerable growth in Indonesia's transportation facilities will also result from development in other industries, such as rail, road and port expansion in conjunction with agricultural, forestry, mining and petroleum projects.

U.S. suppliers and engineering firms can participate in Indonesian transportation development and increase equipment exports considerably by maintaining a strong and active presence and by planning their marketing approach to meet Indonesian transport needs.

STRUCTURE AND SIZE

Road System

Indonesia's road system has a total length of 82,000 kilometers (km), divided into national highways (10,000 km), provincial highways (22,000 km), and district roads (50,000 km).

The Government is responsible for construction and maintenance of most roads. In addition, agricultural estates, logging firms, and oil companies construct and maintain roads in their own areas. These private roads are estimated to constitute as much as 5% of the total road system.

Roads in Java and Sumatra represent 68% of the total roadway distances in the country. Sulawesi's roads make up 16% of the total, and those in Kalimantan, 6%. The road system is less developed in other parts of the country.

Java's high population density and higher state of economic development are reflected in the fact that the island comprises only 7% of Indonesia's land area but has 34% of the total road distances. Kalimantan, on the other hand, makes up 29% of the land area but has only 6% of the roads.

Java also has the highest number of registered vehicles per km of road length. Therefore, many of its arterial roads, particularly near the major cities, experience traffic volumes far beyond capacity. The

three most heavily used and congested highway links in Java are the Jakarta-Bogor road (56 km), the Jakarta-Cikampek road (70 km) and the Surabaya-Gempol road (39 km).

Only about 25% of the total public highway system in Indonesia is paved. About 62% of the national highways, 49% of the provincial highways, and only 6% of the district roads are paved. The unpaved road surfaces are gravel (37%) and earth (38%). Although provincial roads are often paved, they are generally underdesigned for present-day traffic, which includes bus and truck traffic. Pavement widths vary from 3 to 8 meters; shoulders are generally nonexistent or very narrow, road drainage is poor, and most bridges are both narrow and structurally deficient. Paving is usually bituminous macadam in poor condition from heavy traffic loads and lack of maintenance. Underlying soils are generally structurally inferior and often saturated because of the high natural ground water level.

Axle-load limits for vehicles on pneumatic tires range from 1,500 to 7,000 kilograms (kg); the road network is classified as follows:

Road Class	Maximum Permissible Axle Load
I	7,000 kg
II	5,000 kg
III	3,500 kg
III A	2,750 kg
IV	2,000 kg
V	1,500 kg

To protect road from damage by overloaded vehicles, trucks having a gross vehicle weight between 7,200 kg and 9,000 kg are permitted to operate only on Class I and Class II roads. Trucks with a gross vehicle weight of 9,000 kg are permitted to operate only if the vehicle-plus-load total weight does not exceed 8,000 kg. These limit regulations are established by the Ministers of Communications, Interior, Public Works, and Electric Power. Governors of the provinces have the authority to enforce these regulations, and weighing stations are set up in the provinces for this purpose; however, enforcement is inconsistent.

The maximum permissible axle load of 7,000 kg is quite low compared to figures available for other developing countries. Moreover, only 1% of the national highways are Class I roads; 12% are class II; and 87% are class III or below. None of the provincial highways qualify as Class I roads; 5% are Class II, and 95% are Class III or below. (For information on highway construction see Construction and Public Works.)

Motor Vehicle Population

According to official statistics, 331,000 passenger cars were registered in 1975, along with 192,100

trucks and buses, and 1,205,400 motorcycles or motor scooters. Of registered vehicles, the number in operation was estimated at 287,900 passenger cars, 144,100 trucks and buses, and 906,000 motorcycles or motor scooters. Between 1975 and 1980, the number of passenger cars in operation is expected to increase by an average annual rate of 7%, trucks and buses by 10%, and motorcycles/scooters by more than 20%.

Review of vehicle registration statistics for 1974 indicates that 70% of all motorized vehicles were on Java and Madura (28% in the city of Jakarta alone), and 19% were on Sumatra.

Passenger Transport

Passenger transport in Indonesia ranges from privately owned, chauffeur driven limousines to converted trucks which, packed with passengers, provide access to the remote and offroute parts of the country. In addition to motor-driven vehicles, the country abounds with a wide variety of animal-drawn and human-powered vehicles.

Taxis.—Taxi service has grown rapidly in recent years. Taxis not only service the urban areas, but also outlying areas. There are several large taxi firms, hundreds of small firms, and many individuals who own or rent vehicles.

P.T. Blue Bird Taxi owns a fleet of 300 metered cabs and 100 rental cars, all Holden (Australia) vehicles. The firm started in 1964 and grew slowly for 10 years. In 1973 its fleet consisted of 100 cars of assorted years. In 1974, 300 new Holden vehicles were purchased. The firm is licensed for business on Java and Bali, but its operations are centered in Jakarta. Maintenance is handled at two company garages which employ 20 persons each. Maintenance training is handled through an in-company apprentice program.

Private fleets and company cars account for a large percentage of the automobiles in service. Exact figures are not available, but the automotive fleet of one major contractor consists of: 6 passenger vans, 16 sedans, 28 1-ton pick up trucks, and 1 motorcycle. The firm has its own maintenance facilities.

Buses.—An estimated 35,000 buses are in use throughout Indonesia. These include passenger capacities from 20 to 50, but overcrowding of buses is so common that it is not unusual to find a bus with a seating capacity of 20 people carrying 40 or more passengers, a large amount of hand-carried cargo and market produce, and even an occasional chicken or two.

In addition to the large buses mentioned above, there are an estimated 50,000 ancient converted small trucks which serve as passenger vans, taking

passengers to smaller spur roads and generally catering to the passengers' requirements as requested.

The average age of buses and passenger vans ranges between 5 and 10 years, but many are in the antique category. These vehicles are slowly being replaced by newer model passenger vans and carryalls.

Thirteen bus companies are located in Jakarta. With the exception of the city-owned firm P.N. Pengangkutan Penumpang Djakarta (P.N. P.P.D.) whose fleet numbers 772, fleets range between 65 and 230 buses. All bus companies must be licensed by the Government and must operate within assigned routes. The major Jakarta firms are:

Company Name	Fleet
P.T. Saudaranta	135
P.T. Jakarta Transport	165
P.T. Merantama	200
P.T. Arion	105
P.T. Pelita Mas Jaya	160
P.T. Solo Bone Agung	65
P.N. PPD	772
P.T. Metropolitan Jakarta Transport	85
P.T. Sukabumi Motor Supply	165
P.T. Medal Sekarwangi	230

P.N. P.P.D., the government-owned bus company, began in 1954 when it took over the Dutch-owned firm, N.V. Bataviasehe Verkeers Maatschappij. In 1961 it officially became P.N. Pengangkutan Penumpang Djakarta. In 1967 the Government saw the need for serious administrative reorganization within the firm. The firm has grown steadily since that time, and its fleet has increased from 40 to its present size. Most of the vehicles are Mercedes-Benz (Germany) and Leyland (U.K.). P.N. P.P.D. expects delivery in 1977 of 500 new Leyland buses and 500 new Mercedes-Benz vehicles.

P.N. P.P.D. has five passenger terminals radiating out from the central terminal in Benteng Square, Central Jakarta, and plans to add four more passenger terminals in the near future. Other bus companies may use them providing they pay a usage fee.

The company has three repair depots, at Kebayoran, Kramat, and the newest one under construction at Cililitan, which when completed will reportedly be the most modern facility in Asia. The \$1.3 million facility is being financed by a government-to-government loan from West Germany. In addition to complete repair and maintenance facilities, the center will contain a new administration building, spare parts depot, medical clinic, mosque, staff housing, and radio control to the other passenger and service depots. A German technical advisor is supervising construction and equipment installation.

P.N. P.P.D.'s fleet expansion program is as follows:

Year	Fleet	Undergoing Rehabilitation	Operational
1967	250	210	40
1968	250	140	110
1969	251	80	171
1970	258	46	212
1971	246	24	215
1972	220	5	215
1973	232		232
1974	200		200
1975	343		343
1976	772		772
1977	1,772		1,772

Intercity service is provided by a State-owned bus company, P.N. Damri, and by several dozen firms which serve routes radiating out from the major cities.

The State-owned P.N. Damri offers regular intercity service throughout Java and Sulawesi. Routes are projected for Nusatenggara and for Irian Jaya. Headquartered in Jakarta, P.N. Damri has district offices in Semarang, Central Java; Surabaya East Java; and Jayapura, Irian Jaya. It has 17 stations serving its regular routes, and maintenance is handled at four workshops in Bandung, West Java; Tasikmalaya, West Java, Jogjakarata and Surabaya. Most routes are served by a fleet of modern Mitsubishi/Fuso buses. Passenger terminals normally consist of open-air parking lots with simple shed structures to shield passengers.

P.T. Gajah Makmur Abadi ("Gamadi"), provides regular daily service between Jakarta and Tangerang, 35 km west of Jakarta. Gamadi's fleet consists of 200 Dodge-Chevrolet buses (32 seats), 21 Fiat buses (50 seats), and 6 Ford buses (50 seats). Gamadi has a reputation for good maintenance of its vehicles.

Gamadi began business in late 1970 with 10 buses. During 1971 the firm acquired 100 Dodge-Chevrolet gasoline engine buses through a hire-purchase agreement with the City of Jakarta, and in 1972 added an additional 100 buses. In late 1974, the company gradually began to convert the vehicles to diesel using Perkins' diesel engines. By the end of 1976 only 10 buses still had their original gasoline engines.

Regular maintenance and repair is done at Gamadi's workshop. The 2-hectare site includes a parking area for buses, two workshops with spare parts inventories, a fuel station, an office building, and staff housing.

Cargo Transport.—The majority of major trucking firms are headquartered in Jakarta. An estimated 100,000 trucks are in Indonesia, most from 5 to 15 years old, but both modern vehicles and relics are also in service. Major cargo transport firms have in-house maintenance departments.

Major firms include P.N. Damri and P.T. Djakarta Lloyd who each have extensive national networks. C.V. Siliwangi Bangkit has offices in Jakarta, Semarang, and Surabaya. C.V. Setia Dagang has offices

throughout Sumatra in Lampung, Palembang, Lubuk Linggau, Lahat, Curup, Bengkulu, Padang, and Jambi. The largest private firm is the Australian affiliated Elteha International, in Jakarta, which has a comprehensive national passenger, parcel, and cargo service with about 100 trucks and buses. The firm also operates an international cargo transport service. Small local firms also play a significant role in the industry.

P.T. Tiara Biru is a Jakarta-based short haul trucking firm whose fleet consists of 40 1-ton capacity Holden (Australia) trucks. Most of the trucks were purchased new in 1974. The firm's primary service is transporting vegetables from farms to urban markets in Bogor and Jakarta. Minimal amounts of other commodities are handled through rental arrangements. The firm employs 1½ drivers per truck. All maintenance, training of mechanics, and driver training are handled in-house.

Most cargo terminals are simple and minimally equipped. There are normally no mechanized cargo handling facilities, and most cargo is loaded and unloaded by manual laborers. At some of the larger terminals forklift trucks or on-truck cranes may be used. Storage facilities are minimal and overcrowded, and merchandise is often left exposed to the elements until claimed. Refrigeration facilities are extremely limited and available only in the major urban areas.

All long-distance truck companies haul primarily agricultural products such as soybeans, edible oil, and sugar. In addition several companies have cargo originating from recently established industries located mainly around Jakarta and Surabaya; such cargo includes cement, fertilizer, and engineering goods. Along with Indonesia's growth of industrialization, medium- and long-distance industrial hauls are expected to expand greatly.

Maintenance

Vehicle maintenance in Indonesia ranges from the multi-million dollar bus fleet maintenance facilities under construction by P.N. P.P.D. in Jakarta to small sheds equipped only with hand tools. Throughout the country approximately 50% of all vehicle repairs are through dealerships. Spare parts are distributed through thousands of small stores located throughout the country. Most bus and trucking firms and private fleet operators handle repair and maintenance as an in-house function.

The Ford maintenance program includes a 6-month or 10,000 km warranty for parts and labor and a 1,500 km free service guarantee. Its network consists of the main repair shop in Jakarta and 22 agents located throughout Indonesia. Ford stocks \$250,000 worth of spare parts in Indonesia; another estimated \$2 million of Ford parts is handled by in-

dependent dealers and repair shops. Some Ford workshops are well equipped with modern automotive maintenance equipment. Most mechanics are graduates of Indonesian technical schools and trained by Ford on-the-job.

Central Service Station in Jakarta specializes in Peugeot, Renault, and Volvo maintenance. Central has been in operation since 1972, has one branch, and plans to open a second branch. It employs 10 administrative personnel and 70 mechanics who receive their training on-the-job, with periodic visits by factory representatives. The firm handles about 1,350 vehicles per month and provides general servicing; paint, body and upholstery work; and installs air-conditioners and radios. Equipment is minimal and work is labor intensive. Central has a well-stocked spare parts department and retails parts to the public.

Toyota has been providing maintenance services in Indonesia since 1971. The Toyota network consists of three service stations in Jakarta, two in Surabaya, and one each in Semarang, Solo, Medan, Palembang, and Ujung Pandang. The Jakarta shops operate separately from the new car showrooms, and service a total of 200 to 225 vehicles daily. The service facilities in the outlying areas are all associated with authorized Toyota dealerships. The workshops are well equipped to service Toyota cars and offer a full range of services including general maintenance, body and paint work, engine overhaul, differential, and transmission work. Mechanics receive 1½ years training at a Toyota training school located in Jakarta, staffed by factory trained instructors.

PRINCIPAL GOVERNMENT OFFICES

The Directorate-General for Land Communications within the Department of Communications is the major national agency responsible for regulation of road transport. The address is: Directorate-General for Land Communications, (Department of Communications, Jl. Jen. Sudirman P59/60, Jakarta).

The Central Government, through the Directorate-General of Highways, Department of Public Works and Electric Power, is responsible for national highways. Provincial governments are responsible for provincial highways, and regency (kabupaten) governments for district or feeder roads.

The Central Government finances construction of both national highways and those provincial highways deemed to be of national importance, as well as the maintenance of national and most provincial highways. Provincial governments provide funds for the construction and maintenance of provincial and district roads, sometimes with assistance from the

Central Government. Financing assistance for the construction and maintenance of feeder/district roads is also provided through the INPRESS (Presidential Subsidy) program. The Central Government is currently undertaking a countrywide study of feeder road requirements.

ROAD TRANSPORT TRENDS, PROGRAMS, AND PROJECTS

National Development Plan Projects

Specific road transport projects proposed for the period of the current national development plan (Repelita II, 1974/75–1978/79) include five programs at an estimated cost of over \$20 million. The projects include a new bus system, weighbridges, a motor vehicle testing center and several regional testing stations, and new traffic control signal systems. All projects are under the jurisdiction of the Directorate-General of Land Transport in the Department of Communications.

A survey of bus transport conducted by P.N. Damri, the State-owned firm, indicates that maintenance of the present antiquated fleet is excessively costly; one reason is that 90% of the buses are, on the average, 5 years old. Growing demand for services cannot be met in the cities outside Jakarta. Whereas the Jakarta transport system has a number of private bus systems, such is not the case in other cities. The survey proposes the expenditure of \$9.4 million, including \$8.9 million in foreign exchange costs for the purchase of 1,000 city buses and spare parts for use in provincial cities.

Although regulations governing road weight limits exist, they are inadequately enforced, and overloaded trucks cause road damage. In mid-1976 there were about 110 weighbridges throughout Indonesia, of which 60 were in operation before World War II. The current national development plan calls for purchase of 103 weighbridges by 1979 at a total cost of \$1.8 million, of which \$1.6 million would be in foreign exchange costs. New weighbridges would be used not only to prevent damage to roads and bridges but also to monitor the transport of commodities.

To enforce automobile safety requirements, a central automobile testing center is planned for construction in Jakarta. The proposed center's equipment would cost \$1.5 million. In addition, several other testing stations are planned to be located throughout Indonesia to enforce safety regulations. Twelve testing stations are to be built in nine provinces of Java and Sumatra at a cost of \$2.5 million, of which \$1.1 million would be foreign exchange costs.

Automatic traffic control systems are badly needed in various Indonesian cities and towns. The current

national development plan calls for the installation of traffic controllers throughout Indonesia at a cost of \$5.8 million, of which \$5.4 million would be foreign exchange costs.

There has been no direct foreign investment in Indonesia's road transport system although most major vehicle manufacturers have licensed assembly plants in the country. Domestic Indonesian companies have not taken advantage of government investment incentives for transportation projects; in 1975 and 1976 only one such project was approved: it was for P.T. President Taxi in Jakarta, which invested \$2.9 million in a fleet of taxis.

ROAD TRANSPORT GROWTH PROSPECTS

The current national development plan projects increases in the annual levels of investment throughout the road transportation system. Plans for investment in highways and bridges have been reduced to some degree in physical terms, however, and revalued for price inflation. Investment in 1974/75 and 1975/76 fell below planned targets, and some shortfall is expected during the remainder of the plan period to 1979. The fundamental hindrances to road construction and maintenance programs are financial constraints and the inability of the Government to effectively utilize the available funds. For this reason the Government has procured the services of foreign consulting and engineering firms in highway programs.

Projections of the current national plan for production of four-wheel vehicles and motorcycles/scooters vary significantly from those made by the Indonesian Tire Manufacturers Association. The national plan forecasts production of 70,000 four-wheel vehicles and 575,000 motorcycles by 1979, but the Association predicts a production of 94,000 four-wheel vehicles and only 385,000 motorcycles/scooters. In view of the expected greater demand for trucks and buses, the Association's figures are probably more realistic estimates.

ROAD TRANSPORT MARKET SIZE

Between 1973 and 1974, Indonesia's oil boom and the increased income in many sectors of the economy led to a 79% jump in sales of road transport equipment, from \$262 million to \$468.5 million (see table 1). In 1975 another 13% increase boosted the market to \$530.5 million, including \$98.4 million in automobile sales, \$3.3 million in bus sales, \$98.7 million for trucks, \$180.2 million for other road vehicles, and \$149.9 million for motor vehicle and highway

Table 1.—Indonesia: Size of The Market for Road Transport Equipment
(US \$1,000)

	1973	1974	1975	1976	1980
AUTOMOBILES					
Domestic Production	115	250	1,000	2,000	150,000
Imports					
United States	66	89	100	150	150
Japan	21,670	35,000	44,000	—	—
West Germany	11,903	20,633	29,000	—	—
Italy	3,261	3,987	6,430	—	—
France	2,599	14,257	14,700	—	—
United Kingdom	550	2,191	2,100	—	—
Others	353	1,157	1,100	—	—
Total	40,402	77,314	97,430	112,000	148,650
TOTAL MARKET	40,517	77,564	98,430	114,000	298,650
BUSES					
Domestic Production	50	130	180	1,430	4,000
Imports					
United States	100	1,200	670	850	1,460
Japan	758	1,546	1,200	—	—
West Germany	607	115	300	—	—
United Kingdom	330	209	250	—	—
Singapore	83	155	130	—	—
Netherlands	20	60	30	—	—
Others	332	785	500	—	—
Total	2,230	4,070	3,080	4,240	10,060
TOTAL MARKET	2,280	4,200	3,260	5,670	14,060
TRUCKS					
Domestic Production	100	200	700	800	100,000
Imports					
United States	6,100	6,100	6,900	8,300	12,600
Japan	35,780	76,900	74,450	—	—
Italy	260	—	2,940	—	—
West Germany	6,650	9,900	9,800	—	—
Austria	—	210	980	—	—
France	340	170	970	—	—
Others	6,870	2,720	1,960	—	—
Total	56,000	96,000	98,000	106,000	180,000
TOTAL MARKET	56,100	96,200	98,700	106,800	280,000
OTHER ROAD VEHICLES					
Domestic Production	20,000	50,000	75,000	100,000	488,000
Imports					
United States	2,276	3,343	5,067	6,353	27,750
Japan	44,097	86,250	83,788	—	—
Singapore	882	1,350	1,496	—	—
United Kingdom	469	877	965	—	—
Australia	436	815	896	—	—
West Germany	208	380	410	—	—
Others	9,496	20,625	12,622	—	—
Total	57,864	113,640	105,244	176,000	185,000
TOTAL MARKET	77,864	163,640	180,244	276,000	673,000
MOTOR VEHICLE AND HIGHWAY TRANSPORT PARTS AND ACCESSORIES					
Domestic Production	230	600	2,200	12,000	300,000
Imports					
United States	6,200	7,100	6,200	9,110	15,380
Japan	28,000	49,000	59,000	—	—
West Germany	8,180	18,400	22,500	—	—
Australia	8,700	14,200	16,500	—	—
United Kingdom	3,800	5,800	7,500	—	—
France	2,800	5,210	6,000	—	—
Italy	2,300	5,600	6,000	—	—
Others	25,020	20,690	24,000	—	—
Total	85,000	126,000	147,700	182,480	307,720
TOTAL MARKET	85,230	126,600	149,900	194,480	607,720
TOTAL MARKET SIZE	261,991	468,504	530,534	669,950	1,873,430

Source: Official Indonesian and supplier statistics, and estimates based on trade source interviews.

transport parts and accessories. For 1976 a 31% increase over 1975 sales is projected. By 1980, an average annual growth rate of 28% is expected to bring the market for road transport equipment to \$1.9 billion.

Indonesian demand for automobiles grew rapidly from 1973 to 1974, and sales shot up by 91%. In 1975 an additional 27% increase in purchases of automobiles brought the market to \$98.4 million; growth at about the same rate is expected between 1976 and 1980, and 1980 sales of automobiles are projected at nearly \$300 million.

Bus sales almost doubled between 1973 and 1974, reaching \$4.2 million, but 1975 showed a decline of 22%. However, bus sales are expected to increase by 74% in 1976 to \$5.6 million; the average annual increase in bus sales for the 1976-80 period is projected at about 25%.

Truck sales, valued at \$56.1 million in 1973, increased 71% to \$96.2 million in 1974. Sales between 1976 and 1980 are expected to increase at an average annual rate of 28% and amount to \$280 million in 1980.

Indonesian purchases of other road vehicles, particularly motorcycles, have also shown dramatic increases in recent years. Between 1973 and 1974 these sales more than doubled, and in 1975 the market topped \$180 million. Another 53% sales gain is expected in 1976, and annual growth is forecast to average about 25% between 1976 and 1980 for total sales of \$673 million by the latter year.

Between 1973 and 1974, the Indonesian market for motor vehicle and highway transport parts and accessories increased from \$85.2 million to \$126.6 million. Sales reached \$149.9 million in 1975 and are estimated at \$194.4 million for 1976. An average annual increase of 33% is projected over the next 4 years, and sales of \$607.7 million are expected in 1980.

Imports of equipment, tools, and test instruments for vehicle servicing and maintenance are not accurately reported in official trade statistics; however, industry sources estimate that 1975 sales amounted to about \$6 million. Japanese suppliers have approximately 40% of the market, followed by West German and Australian manufacturers with 10% and 15% market shares respectively. By 1980 sales are expected to increase to approximately \$24 million.

Indonesian sales of lifting and loading equipment used in highway freight loading and storage operations were estimated at approximately \$10 million in 1975. Japan and West Germany are the principal sources of supply. Small cranes and forklift trucks are the major types of equipment sold. Imports in 1980 are projected at about \$21 million. Australian suppliers are expected to provide increasingly more of this type of equipment.

Imports

Imports have supplied most of the Indonesian market for road transport equipment. In 1973, for example, the share of the market by value supplied by imports was as follows: automobiles 99%, buses 98%, trucks 99%, other road vehicles (such as motorcycles) 74%, and motor vehicles and highway transport parts and accessories 99%. However, domestic vehicle assembly and production are increasing, and the share supplied by imports is expected to decline sharply by 1980 to the following: automobiles 50%; buses 72%; trucks 64%; other road vehicles 27%; and motor vehicles and highway transport parts and accessories 51%.

Although Indonesian vehicle imports will represent a smaller share of total market sales, the value of imports is not expected to decline, since local assembly will continue to depend upon knockdown or semiknockdown units. Thus, between 1975 and 1980, import value of knockdown automobile units is projected to increase from \$112 million to \$148.6 million; buses, from \$3 million to \$10 million; trucks, from \$98 million to \$180 million; other road vehicles, from \$105.2 million to \$180 million; and motor vehicles and highway transport parts and accessories from \$149.9 million to \$607.7 million.

Japanese automobile suppliers are leaders in the Indonesian market with a 45% market share in 1975, and this lead is expected to be maintained through 1980. West German suppliers were second with a 30% market share in 1975.

Japanese, German, and U.S. manufacturers lead in supplying buses. In 1975 the import market shares were 37% for Japanese, 21% for American, and 10% for West German suppliers.

In 1975 Japanese manufacturers had a 75% share of Indonesia's truck imports; West German suppliers, 10%; and U.S. suppliers, 7%.

In the Indonesian market for other road vehicles, including motorcycles and special application vehicles, Japanese suppliers had an 80% share of 1975 imports, followed by U.S. suppliers with a 5% share. By 1980 the U.S. share is expected to increase to 15%.

Leading suppliers of vehicle parts and accessories imports in 1975 were Japanese, with a 39% market share, West German with 15%, and Australian with 11%.

Domestic Manufacturing

Indonesian production of road transportation equipment is expected to increase substantially. During 1976 domestic production consisted primarily of the assembly of imported knockdown or semiknockdown units. However, domestic component manufac-

turing is expected to increase substantially in future years. Between 1975 and 1980 increases in the value of domestic production are estimated as follows: automobiles, \$1 million to \$150 million; buses, \$.1 million to \$4 million; trucks, \$.7 million to \$100 million; other road vehicles, \$75 million to \$488 million; and parts and accessories, \$2.2 million to \$300 million. Indonesian exports of road transport equipment are negligible and are expected to remain so through 1980. (For further information on motor vehicle and parts production see Metallurgical and Metalworking Industries).

Motor vehicle supply.—With few exceptions, the importation of completely built-up passenger cars and motorcycles/scooters has been prohibited by Indonesian law since 1974, and domestic production is limited to assembly. Thus, official trade statistics reflect imports of knockdown units. However, it is important to note that personnel assigned to foreign embassies and international organizations (such as the United Nations and the World Bank) are allowed to import vehicles duty-free and in fully built-up condition. Since there is a substantial community of these expatriates, estimated at 5,000 individuals and/or family units, who are frequently reassigned and thus sell their automobile in Indonesia, the impact on the market is significant.

The 1975 production/assembly was estimated at 27,000 passenger cars, 37,000 trucks and buses, and 230,000 motorcycles/scooters (see table 2). By 1980 production of passenger cars is expected to reach 45,000; trucks and buses 60,000, and motorcycles/scooters, 425,000. These estimates amount to an annual average increase of over 10% for passenger car, truck, and bus production, and 13% for motorcycle/scooter production during the 1975–80 period.

Motor vehicle tire supply.—There are four major producers of motor vehicle tires in Indonesia. Bicycle tires are produced by a number of smaller firms. The largest producer, the U.S.-owned P.T.

Goodyear Indonesia located in Bogor, West Java, represents 70% of total motor vehicle tire production capacity. By 1980, P.T. Goodyear Indonesia is expected to have a 45% share and, a new Japanese owned firm, Bridgestone a 27% share. The two other plants Intirub (Jakarta) and Ban Palembang (Palembang South Sumatra) are government owned, but operated by Goodyear under management agreements. The following tabulation shows 1975 and estimated 1980 tire production in Indonesia.

Firm	Output (tires per day)	
	1975	1980
Goodyear	3,760	5,000
Intirub	900	2,000
Ban Palembang	700	1,000
Bridgestone	—	3,000
Total, all firms	5,360	11,000
Total tires per year (1,000) ..	1,608	3,300

Total demand for automobile tires in 1975 was estimated at 940,200, while demand for bus and truck tires was estimated at 1,023,400 and that for motorcycles/scooters at 1,094,000 (see table 3). In 1975, imports supplied 17% of the passenger car tires, 22% of the bus and trucks tires, and 20% of the motorcycle/scooter tires. By 1980 total demand for passenger car tires should reach 1.3 million, while bus and truck tire demand should reach 1.7 million and motorcycle/scooter tire demand, 2.5 million.

MARKET OPPORTUNITIES

Growth in motor vehicle assembly has caused motor vehicle components and parts to have the highest sales potential. In the automobile industry, only those parts that are difficult to manufacture in Indonesia are expected to be imported. Sales prospects will be greatest for such items as ball bearings, gears, transmissions, electronic parts, and specialized heavy duty components.

Table 2.—Indonesia: Imports and Production of Motor Vehicles ¹
(No. of Units)

Year	Passenger Cars		Trucks and Buses		Motorcycles/Scooters	
	Imports	Local Production	Imports	Local Production	Imports	Local Production
1970	6,000	1,981	12,600	2,467	46,828	45,000
1971	9,300	6,514	17,400	11,109	52,007	60,000
1972	11,200	10,302	16,100	11,816	68,332	110,000
1973	22,400	17,474	23,900	19,485	139,877	150,000
1974	23,800	27,073	35,100	32,729	194,451	200,000
1975		27,000		37,000		230,000
1976		32,000		43,000		265,000
1977		33,000		46,000		305,000
1978		36,000		50,000		350,000
1979		40,000		54,000		385,000
1980		45,000		60,000		425,000

¹ Includes both knockdown and built-up vehicles.

Source: Indonesian Tire Manufacturers Association.

Table 3.—Indonesia: Tire Imports and Production
(1000 Units)

	Passenger Car Tires			Bus/Truck Tires			Motor/Scooter Tires		
	Imports	Local Production	Total Demand	Imports	Local Production	Total Demand	Imports	Local Production	Total Demand
1970	296.1	153.2	449.3	223.1	160.3	383.4	335.0	14.0	349.0
1971	294.0	177.0	471.0	348.2	179.7	527.9	394.0	34.0	428.0
1972	129.4	342.2	471.6	197.6	383.1	580.7	433.0	120.0	553.0
1973	324.4	484.7	809.1	328.0	536.1	864.1	335.0	370.0	705.0
1974	420.1	507.1	927.2	469.8	475.4	945.2	199.0	700.0	899.0
1975	165.2	775.0	940.2	220.4	803.0	1,023.4	224.0	870.0	1,094.0
1976			1,035.5			1,135.0	(81.0)	1,390.0	1,309.0
1977			1,104.0			1,274.0	(104.0)	1,660.0	1,556.0
1978			1,188.8			1,406.2	(124.0)	1,960.0	1,836.0
1979			1,275.5			1,551.5	(155.0)	2,283.0	2,128.0
1980			1,349.9			1,725.1	(133.0)	2,583.0	2,450.0

Source: Indonesian Tire Manufacturers Association.

In the truck and bus market, there will be a continuing need to import special vehicles on a fully assembled basis. Very heavy buses and trucks and those for special applications will not be manufactured, and imports will be required.

Sales opportunities will also grow for such special-application vehicles as ambulances and firefighting trucks. There are many opportunities for sales of vehicles to support development programs planned and underway. Small medical utility vehicles will be needed for rural areas throughout the country. The U.S. Agency for International Development is considering support of a program which would result in purchasing of over 100 such vehicles. In agricultural development, special off-road vehicles will be required. For educational development the use of specially equipped vans is planned to bring library services and technical assistance to remote rural areas. There are several other opportunities for sale of vehicles for special applications. Since communications by telephone and mail are often unreliable in Indonesia, messenger services have become popular. Minivans and specially adapted motorcycles provide good service for this purpose. For example, an Indonesian newspaper publisher found it necessary to establish his own fleet of delivery vehicles to ensure distribution.

Opportunities for sales of vehicle service equipment, tools, and test instruments will increase as the number of vehicles in operation grows. Some growth is also expected in sales of small cranes, cranes mounted on trucks, and forklift trucks for freight handling operations.

(For a discussion of Indonesia's needs for road construction technology and services see Construction and Public Works in this survey.)

IMPORT PROCUREMENT

Buyers' Universe

Buyers of road transport equipment are individual consumers, business and industrial firms, transport firms, and government departments. Individual consumers predominate in automobile and motorcycle sales. Among Indonesia's population of 130 million, only about 200,000 people have incomes which permit the purchase of automobiles. In the market for motorcycles, however, the number of potential buyers exceeds 1.2 million.

Private industrial and commercial firms are major purchasers of trucks as well as motorcycles and automobiles. In Indonesia, business executives are customarily supplied with car and driver by the employing firm. Thus, private firms often have substantial fleets of automobiles. Since there are thousands of business firms in Indonesia, and a large number use more than one automobile, bus, truck, or motorcycle, the market is substantial.

Transport firms such as truck and bus companies number about 1,000 throughout Indonesia. Of these, however, only about 100 own large fleets of trucks and buses.

Various government departments, agencies, and enterprises have truck, automobile, and motorcycle fleets. These organizations often have their own vehicle servicing facilities.

Various international and foreign organizations such as the World Bank, many embassies, and United Nations organizations have offices in Indonesia, and offer good opportunities for automobile sales.

Foreign Suppliers' Universe

Almost every major brand of automobile is found in Indonesia. Leading in the market are Japanese

brands such as Toyota, Nissan (Datsun), and Mazda. Also well represented are: Ford and General Motors (supplied not only from the United States but also from Australian and European subsidiaries; Alfa Romeo and Fiat (Italy); Renault, Peugeot, and Citroen (France); Volvo (Sweden); Mercedes-Benz and Volkswagen (West Germany); and British Leyland (United Kingdom).

Leading bus suppliers include Hino, Isuzu, and Mitsubishi (Japan); Mercedes-Benz (West Germany); Ford (U.S.); British Leyland (U.K.); and Bedford (U.K. General Motors).

Japanese firms, chiefly Hino and Isuzu, are major suppliers of trucks. Other suppliers include Ford (U.S.), Fiat (Italy), and Bedford (U.K.). In logging, construction, and mining, very large trucks from Mack and Peterbilt (U.S.) and Volvo (Sweden) are used.

Almost all suppliers operate through agents who undertake sales of the equipment and either purchase on their own behalf and resell or, in the case of buses and trucks, collect commissions on sales. Since the Government prohibits the import of fully built-up automobiles and motorcycles, agents of foreign suppliers often handle both assembly operations and sales. In some cases, foreign suppliers have entered into joint ventures with the Indonesian agent to establish the assembly plants, while in other cases, separate organizations have been established for this purpose.

MARKETING FACTORS

The Indonesian vehicle distribution system is not significantly different from those in other parts of the world. Successful sales of automobiles, trucks, buses, and motorcycles require a local organization capable of arranging for customer credit as well as providing service. The leading motor vehicle agents thus have large service and spare parts centers to provide after-sales support, and credit is offered, in some cases for up to 2 years. However, interest rates are high in Indonesia, and 25% annual rates are not unusual.

It is necessary for Indonesian vehicle distributors to establish branch representation in major market areas throughout the country, such as Central and West Java; North and South Sumatra, Sulawesi, Kalimantan, and East Indonesia. Some distributors have established their own sales and service centers in each area, while others have appointed subagents who are responsible for sales and service in their region.

Motor vehicle service warranties in Indonesia normally cover 1 year and include parts and labor, although a number of variations are made.

Vehicles are advertised in Indonesian newspapers, films, magazines, and billboards. Most sales promo-

tion activity, however, is in making personal sales contacts with prospective customers.

The annual Jakarta Fair in late spring is used by some vehicle distributors to display their vehicles. Special promotion events include rallies and races, which have been particularly successful in developing vehicle sales.

COMPETITIVE POSITION OF U.S. SUPPLIERS

U.S. vehicle suppliers have a very low market share in Indonesia, generally as a result of the multinational production and marketing approach of major U.S.-based manufacturers such as General Motors and Ford. In general, these firms do not export from the United States but have selected other locations in their worldwide operations from which to supply Indonesia. They generally supply from Australia and Europe since vehicles manufactured in those locations are often more suitable to Indonesian needs and are sold at a lower price than those of U.S. manufacture.

Some U.S. suppliers have generally ignored the Indonesian market. Unlike Japanese suppliers who have made a very aggressive approach, U.S. suppliers have tended to make only minimum marketing efforts rather than developing a strong, permanent market position. Many Japanese suppliers have set up local assembly plants, often with a minimum of local input, thereby preserving the largest value-added factor for themselves. Even though this practice will eventually erode, and a greater share of production value will be provided by Indonesians, Japanese suppliers will continue to have a good market for parts and components.

American suppliers' greatest sales opportunities are in the markets for heavy-duty trucks and special-purpose vehicles. U.S. manufacturers offer a wide range of well-designed, durable, special-purpose vehicles needed in Indonesia. These vehicles would best be promoted in demonstration situations so that Indonesian users have the opportunity to observe the equipment in use. Suppliers of vehicle maintenance and test equipment should consider providing equipment to technical schools, or the establishment of their own training programs in order to lay the foundation for future sales.

RAIL TRANSPORT SYSTEM STRUCTURE AND SIZE

The Indonesian Government controls the largest railway system in Southeast Asia. In 1975 it handled 5.8 million tons of freight, 1.3 billion ton/km of

freight traffic, about 32 million passengers, and 3.1 billion passenger/km.

Rail transport is used to transport coal from Sumatra mines. The World Bank is considering an application to support a \$63-million program for rehabilitation and expansion of the Bukit Asam mine, which would include the upgrading of locomotives and coal cars, as well as improvements to the existing rail link to Palembang.

State Railway Agency Organization

The Perusahaan Jawatan Kereta Api (PJKA—State Railway Agency) controls all public railway operations in Indonesia. Its address is: State Railway Agency—PJKA (J1. Gereja 1, Bandung, West Java).

The Indonesian railways were originally organized into the Perusahaan Negara Kereta Api (PNKA—Indonesian State Railway) as a state corporation under the Department of Communications by Presidential Decree No. 22 in 1963. The railroad's revenues were barely sufficient to cover working costs, and government subsidies were regularly required.

In 1971 the Government reorganized PNKA into a departmental public corporation (Perusahaan Jawatan—PJKA) under the Ministry of Communications. As such, although the Government still budgets for PJKA, it is expected to become increasingly independent financially.

The Minister of Communications exercises power over PJKA either directly or through the Director General of Land Transport and Inland Waterways. The Chief Director of Railways, who is responsible to the Minister of Communications, has relative autonomy in day-to-day operations, but his authority is restricted concerning senior staff appointments, changes in staff policy, authorization of capital expenditures, changes in budget allocations, and increases in tariffs.

The national railway system is divided into 6 regional operating divisions, or Eksplotasi (3 in Java and 3 in Sumatra), and 15 technical subdivisions inspectorates or Inspeksi. Each Eksplotasi has a Division Manager responsible to the Director of PJKA; the heads of the technical inspectorates are also responsible directly to PJKA headquarters. Located at PJKA headquarters are the Director of Personnel, Director of Commerce, Director of Operations/Transportation, and Director of Mechanical Engineering/Supply.

PJKA has had management problems, due mainly to the great distances involved in the system and its limited telecommunications facilities, as well as a shortage of experienced staff in the middle and lower echelons, an inadequate accounting system, and poor stock control for spare parts and materiel.

As a result of these problems, it is planned that the management structure will be changed; the position of Director of Operations/Transportation is to be divided into a Director of Transportation for trains, ferries, tariffs, marketing, and claims; and a Director of Civil Engineering for railway ways, works, signaling, and communications. The position of Director of Supply/Workshops will be divided into a Director of Mechanical Engineering for workshops, depots, traction, and electrical engineering; and a Director of Stores to control purchases and issues, storage, and inventory.

Since 1966, the staff employed by the Indonesian railways has decreased from 88,586 to about 60,000. PJKA plans to continue a policy of early retirement in order to reduce employment to 48,000 by 1979. It also plans to increase worker productivity through new investments (such as in dieselization), and operational and management improvements.

PJKA Track System

PJKA operates a rail system of 6,793 route/km on Java, Madura, and Sumatra. In this system, 182 km are double track, of which 110 km are electrified (1,500 VDC). The network functions as six unconnected systems on the islands of Java, Madura, and on the island of Sumatra in the provinces of South Sumatra, North Sumatra, West Sumatra, and Aceh respectively. The systems on Java and Madura include 4,741 route/km (70% of the total), of which 2,792 km are mainlines.

Most track gage is 1,067 mm. Of the total railway system length, 67% are main lines and 33% feeder lines. About 20% of the track system is laid with heavy 41-kg/m rails, 29% medium 33- to 38-kg/m rails, and 51% ranging from 25 kg/m to 30 kg/m rails. Most main lines have 41-, 38-, and 31-kg/m rails, and the branch lines have 25- to 30-kg/m rails. Ballast is of crushed stone or gravel and is considered inadequate except for a few sections on the main lines in Java.

Track fittings are old, mostly rigid types. However, some elastic types have recently been installed. Because of inadequate renewals, a large portion of fastenings and some points and crossings need replacement. About 1,100 km of track has been welded in panels of 85-m length, and there are plans to weld an additional 700 km of track.

The maximum speed permitted on main lines in Java is 90 km/h, but because of the poor track condition, many speed restrictions are in effect. Permissible axle loads on main lines in Java vary from 20 tons to 12 tons; a large portion of the lines is classified for 15 tons and over. The permissible axle load in South Sumatra is 13 tons, and in North Sumatra, 11 tons.

Signaling systems need modernization, especially in Java. Except for a few sections on that island, there is little centralized train control. Of the 396 stations in Java, about half (193) use Siemens-Halske signaling systems and 203 have older types. Main line stations handling more than 12 trains per day usually have signaling installations of the Siemens-Halske type. Most signaling systems, however, are mechanical, varying from double wire and tokenless block instruments to outmoded wooden-lever frame and disc types. Sumatra's 147 stations have only 24 Siemens systems; the rest are about evenly divided between Alkmar and wooden-handle types.

Plans for rehabilitation and improvement of railway signaling include installation of Siemens-Halske systems with tokenless block instruments on Java's main lines and in some sections of Sumatra. About 80% of the mechanical block system can be manufactured locally with imported materials such as signal wire, signal/point levels and shafts for lever frames, electrical plunger locks, and block instruments.

Marshalling Yards.—The main marshalling yards on Java, Jakarta, and Surabaya, each handle 700 to 750 cars per day. There are also intermediate yards at Cikampek, West Java, Cirebon, Semarang, and Bandung. All yards, including those in Lahat and Medan on Sumatra, are considered adequate. Mobility in the yards is expected to improve when increased repair capacity at the workshops permits the removal of stabled cars.

Passenger Depots.—Passenger depots in the major cities were all built before 1940 and reflect the style of European depots of that period. They are simple, functional, and minimally equipped. Outside of the cities passenger terminal facilities vary considerably.

PJKA Locomotives and Rolling Stock

The latest available inventory of PJKA locomotives and rolling stock, in 1973 (see table 4), showed the lowest percentage of usable stock to be in passenger cars—only 26% of the listed fleet of 2,497 were considered serviceable. The highest usable percentage was listed among diesel locomotives; 69% of the 311 total fleet. Most of the passenger cars, locomotives, and freight cars now in use are over 40 years old.

PJKA Traffic

Between 1962 and 1972, passenger traffic on the PJKA system decreased from 7,049 to 3,352 million passenger/km. This drop was caused by a number of factors including: growing competition from road transport, poor and unreliable railway service, reduction in operations on branch lines, and cancellation of some commuter services because of locomotive

Table 4.—Indonesia: PJKA Inventory of Motive Power and Rolling Stock, 1973

	Total in Fleet (on book)	Serviceable Number of Total	Per- centage
Steam Locomotives	856	521	61
Main Line	448	276	62
Branch Line	201	70	35
Shunting	207	175	85
Diesel Locomotives	311	215	69
Main Line	145	109	75
Branch Line	29	13	45
Shunting	137	93	68
Electric Main Line Locomotives ..	11	4	36
Diesel Railcars—Main Line	10	4	40
Passenger Cars	2,497	659	26
Bogie	2,184	647	30
4-Wheeler	313	12	4
Freight Cars	22,279	10,083	45
Bogie	2,381	1,389	58
4-Wheeler	19,898	8,694	44

Source: PJKA.

and passenger car shortages. Further contraction of train services, combined with an increase of about 30% in passenger fares, discouraged short-distance passenger traffic; during 1973 there was a sharp drop in passenger transport. In 1975 the number of passengers carried was 32.3 million, and the number of passenger/km was almost 3.1 billion. The average yearly growth rate of passenger traffic between 1975 and 1980 is expected to be about 5%; and traffic in 1980 is projected to be only slightly higher than the 1975 level (see table 5). Although competition from road transport will continue to reduce the railway's short-haul passenger market, and airlines will take some long-haul passengers, the railways are expected to remain the major carrier of long-distance passengers. Population and income growth may also contribute to increased passenger traffic.

In 1975, the Java and Madura lines carried 91% of passenger traffic. For 1980, passenger traffic is expected to remain concentrated in Java and Madura, with only a small portion in Sumatra.

Between 1962 and 1966, the ton/km of freight traffic carried by the railway system declined by about 23%, mainly due to poor service; increased competition from road transport for short hauls; and reduced production and transport of rubber, coffee, and coal. However, the improved economic conditions and additions to rolling stock helped raise freight traffic by about 9% between 1967 and 1972. In 1973 tonnage increased by 8%; in 1974 by 11%; and in 1975 by 8% to 5.8 million tons and 1.3 billion ton/km. The average annual rate of increase in tonnage for the 1975–80 period is expected to be about 4% and amount to 7.1 million tons and 1.6 billion ton/km by 1980.

In 1975, 69% of the freight tonnage and 80% of the ton/km originated in Java and Madura, and the

Table 5.—Indonesia: Rail Traffic Forecast for PJKA

	1972 (Actual)	1973 (Pro- visional)	1974	1975	1976	1977	1978	1979	1980
JAVA AND MADURA									
Tons Loaded (000)	3,131	3,446	3,790	4,080	4,050	4,280	4,432	4,600	4,885
Ton-km Hauled (million)	831	910	990	1,059	1,049	1,083	1,108	1,133	1,194
Passengers Carried (million)	36.8	26	27.6	29.3	31	32.9	34.8	37	35.55
Pass-km (million)	3,066	2,400	2,480	2,791	2,900	3,125	3,285	3,335	3,387
SOUTH SUMATRA									
Tons Loaded (000)	516	546	645	720	750	842	878	916	1,006
Ton-km Hauled (million)	101	96	116	140	157	177	187	200	220
Passengers (million)	1.03	1.02	1.07	1.13	1.18	1.24	1.30	1.37	1.18
Pass-km (million)	176	178	192	208	224	242	261	282	263
NORTH SUMATRA									
Tons Loaded (000)	653	679	750	800	786	825	866	910	934
Ton-km Hauled (million)	90	90	100	108	107	110	120	128	141
Passengers (million)	1.40	0.86	0.88	0.91	0.94	0.97	1.03	1.05	1.14
Pass-km (million)	89	62	66	68	72	75	78	83	84
WEST SUMATRA									
Tons Loaded (000)	262	250	267	284	300	321	345	370	359
Ton-km Hauled (million)	16	16	18	18	18	18	19	20	16
Passengers (million)	0.89	0.92	0.93	0.94	0.95	0.96	0.98	100	0.77
Pass-km (million)	21	22	22	22	22	23	23	24	30
TOTAL FOR PJKA									
Tons Loaded (000)	4,562	4,921	5,452	5,884	5,886	6,268	6,521	6,796	7,184
Ton-km Hauled (million)	1,038	1,112	1,224	1,325	1,331	1,388	1,434	1,481	1,571
Passengers Carried (million)	40.12	28.80	30.48	32.28	34.07	36.07	38.11	40.42	38.64
Pass-km (million)	3,352	2,662	2,760	3,089	3,218	3,465	3,649	3,724	3,764

Source: PJKA.

remainder in Sumatra. Sumatra freight traffic is expected to increase slightly by 1980, but Java and Madura lines are still projected to carry 68% of the tonnage and 76% of the ton/km hauled by that year.

Rail freight traffic has been predominantly of agricultural products, petroleum products, building materials, forest products, and fertilizers. By 1980, traffic in sugar, rice, building materials, timber, fertilizers, and general goods is expected to increase. The transfer of fertilizer by rail from ports to warehouse will increase substantially. In Java, a growth in rail traffic of rice and sugar will result from demand for long-haul transport to move these surplus commodities from East and Central Java to Western Java, and to the port of Surabaya for export. Rail transport of oil products should decrease because of the projected completion of pipelines.

Repair and Maintenance Facilities

The State Railway Authority has five mechanical workshops for the overhaul, repair, and maintenance of locomotives and rolling stock, as follows:

Operations	Area	City
Passenger cars (steel body)	Java	Jakarta
Freight cars		Surabaya
Diesel locomotives		Jogjakarta
General	South Sumatra	Lahat
General	North Sumatra	Medan

With the exception of the Jogjakarta shop, the workshops are very old, and many machines still operate by belt drive from counter-shafting. Of the workshops' 1,600 pieces of serviceable machinery

and equipment, 40% are over 30 years old. There is a general shortage of adequate handling facilities, tools and gages.

The Mangarrai shop near Jakarta has responsibility for repair of about 1,000 steel passenger cars annually; however, output is only about 250 coaches per year. A proposal to modernize the workshop and increase annual output to 500 cars is under consideration.

The Surabaya shop annually repairs about 2,600 freight cars. Plans call for the addition of items such as wheel-set lathes, wheel-set presses, axle shaft lathes, welding machines, forklift trucks and overhead traveling cranes so that production may be increased to 4,000 cars annually.

The Jogjakarta shop, the newest and best equipped of PJKA's workshops, repairs diesel locomotives. The shop averages about 40 overhauls per year in addition to over 200 unscheduled repairs; however, this does not meet the goals of 80 periodic general overhauls and 190 biannual intermediate overhauls. Additionally, there is a backlog of over 70 inoperative locomotives in Java alone. Plans for improving productivity at the installation include the adoption of unit replacement techniques, improvement of spare parts inventories, and acquisition of new equipment including a balancing machine, a spring rolling machine, welding machines, grinding machines for collectors, a 2,500 horsepower hydraulic brake test system, and several forklift trucks.

The Lahat and Medan workshops in Sumatra are general-purpose railway workshops with old but serv-

iceable equipment. There are plans for investment in new machinery to improve diesel locomotive maintenance capabilities.

A shop in Medan formerly repaired and overhauled steam locomotives, but with the increasing dieselization of the railway, its output has diminished. Its lathes and milling machines have been applied to convert the shop into a way rehabilitation workshop.

PJKA also has a bridge and structural fabricating workshop in Bandung with a capacity of 1,000 tons of steel bridge girders per year. There are plans for expansion of this workshop to 2,000 tons per year.

In addition to the above-mentioned workshops, PJKA has 35 repair depots for locomotives and cars scattered throughout its system. There are plans to equip these depots with lifting jacks, tools, and gages for day-to-day maintenance of locomotives and cars.

RAIL TRANSPORT TRENDS, PROGRAMS, AND PROJECTS

During the first national development plan (Repelita I, 1969/70–1973/74), Indonesia made many improvements to its rail transport system. Among these improvements was the rehabilitation and replacement of rails, locomotives, and various types of railway cars.

For the second national development plan, PJKA prepared its own railway development plan which was accepted by the Government. This plan was based on a study by Deutsche Eisenbahn Consulting GmbH (DE-Consult); the firm was commissioned by West Germany to provide part of a technical assistance project for the Indonesian Government. The plan calls for investment of more than \$247 million with a foreign exchange component of \$150 million.

Main aspects of the plan include rehabilitation of the main lines on Java and to a limited extent those on Sumatra; rehabilitation of signaling and telecommunications equipment; rehabilitation of 59 diesel locomotives, 290 passenger cars, and 4 tank cars; procurement of 60 diesel locomotives, 10 sets (of two cars each) of electric rail cars, 12 sets (of two cars each) of diesel rail cars, 61 passenger cars, and 300 freight cars (including 120 ballast hopper cars); fitting air brakes on about 7,500 freight cars and automatic couplers on about 670 freight cars; improvements to repair facilities; restocking of inventories; and training and extensive technical assistance in management and operations. A total of \$68.7 million in foreign exchange will be spent for locomotives and rolling stock, and \$23.5 million in foreign exchange for track rehabilitation.

By 1980 all the main line services in Java will have been dieselized, and about 260 steam locomotives

will be removed from service. The steam locomotive fleet in Sumatra, for example, will be reduced to 130 units. The plan also calls for scrapping about 1,000 passenger cars (mainly with wooden bodies); 11,175 freight cars by 1977; and another 1,000 freight cars by 1979.

The National Development Planning Agency (BAPPENAS) proposed six railway development projects costing a total of \$63.2 million. The projects, based on the DE-Consult study and PJRA's railway development plan, would not completely achieve Repelita II targets. The six proposed projects include purchases of diesel locomotives, passenger coaches, freight cars, and spare parts in addition to passenger coach and track rehabilitation. The new passenger coaches would be used for short-distance traffic (especially in suburban areas) required for commuting to new business and industrial centers. Freight car purchases are intended to help satisfy the increasing freight traffic demand. Of the more than \$6 million cost for freight car purchases, \$4.7 million is expected to be foreign exchange cost.

The DE-Consult study showed that 290 passenger coaches could be economically rehabilitated and fitted with air brakes. The study thus recommended this rehabilitation, installation of bogies to improve riding quality, and new lighting and ventilation. These improvements, plus track renewal, will enable the coaches to travel at a speed of about 90 miles per hour.

The study's proposal for spare parts procurement recommends expenditures of \$3.3 million, of which \$2.4 million will be in foreign exchange cost. Purchases will include spares for diesel locomotives, passenger coaches and freight cars, rolling stock running gears, signaling and telecommunications equipment, raw materials for workshops and materials for bridges, and railway.

The \$10.6 million plan for rehabilitation of tracks includes \$4.2 million in foreign exchange cost. Proposed projects are renewals of 172 km of rails, 1,600 km of fastenings, 2,800,000 m³ of ballast, and 1,350,000 pieces of sleepers.

World Bank Loan

In support of the Indonesian rail transport development program, in 1974 the World Bank (IBRD) approved a \$48 million loan to the Indonesian Government for PJKA rail system rehabilitation and development. The loan included financing of \$11 million for purchase of 24 new diesel locomotives, \$6 million for 6 new passenger cars, \$3.6 million for 200 new freight cars, and \$4.84 million for track material.

In 1975 the Indonesian Government awarded a contract to a consortium composed of the Canadian

Pacific Consulting Services (CPCS) of Montreal and the French consulting firm, SOCERAIL, to provide technical assistance to PJKA in the implementation of the development program. The consortium will assign 33 experts to PJKA offices in six Indonesian cities to advise on operations, planning, maintenance, and development programs.

RAIL TRANSPORT GROWTH PROSPECTS

Intermodal competition will continue to result in shifts in the pattern of passenger and freight traffic through 1980. The national plan to invest \$248 million in railway rehabilitation is unlikely to be realized by the end of the current planning period in 1979. Although the World Bank loan will help considerably in meeting projected goals, there are two reasons which may result in plan shortfall: (1) PJKA's inability to utilize the funds by 1980 resulting from a shortage of trained manpower and managerial inefficiencies; and (2) limitations in the government budget stemming from the financial problems of the national petroleum corporation, Pertamina.

Nevertheless, even if PJKA can only partially fulfill the current plan goals, it would prepare the groundwork for further development. This will be particularly true if PJKA's organizational structure can be strengthened within the next few years and technical capabilities improved.

RAIL TRANSPORT CAPITAL GOODS MARKET SIZE

From 1973 to 1974, total Indonesian sales of railway transport equipment declined 47% from \$7.5 million to \$4 million, mainly due to reduced purchases of locomotives (see table 6). Large expenditures for locomotives were made in 1975, however,

Table 6.—Indonesia: Size of the Import Market for Rail Transport Equipment
(U.S. \$000)

	1973	1974	1975	1976	1980
LOCOMOTIVES					
United States	—	—	900	1,500	2,400
West Germany	4,330	975	600	—	—
United Kingdom	320	225	360	—	—
Australia	100	—	330	—	—
Japan	28	—	300	—	—
France	—	—	360	—	—
Others	22	—	150	—	—
Total	4,800	1,200	3,000	5,000	8,000
TOTAL MARKET	4,800	1,200	3,000	5,000	8,000
RAILWAY SELF-PROPELLED CARS					
United States	—	—	—	—	—
West Germany	22	23	30	—	—

Table 6.—Indonesia: Size of the Import Market for Rail Transport Equipment—Continued
(U.S. \$000)

	1973	1974	1975	1976	1980
RAILWAY SELF-PROPELLED CARS—Continued					
United Kingdom	11	—	50	—	—
Netherlands	2	—	10	—	—
Australia	—	—	2	—	—
Japan	—	—	2	—	—
Others	—	—	2	—	—
Total	35	23	96	112	440
TOTAL MARKET	35	23	96	112	440
RAILWAY ROLLING STOCK COMPONENTS					
United States	40	30	80	280	560
West Germany	900	590	632	—	—
France	270	180	315	—	—
United Kingdom	120	80	158	—	—
Japan	50	30	80	—	—
Australia	60	40	110	—	—
Others	60	50	125	—	—
Total	1,500	1,000	1,500	2,000	4,000
TOTAL MARKET	1,500	1,000	1,500	2,000	4,000
RAILWAY FIXTURES, SIGNALS, AND CONTROLS					
United States	45	40	50	70	170
West Germany	335	350	510	—	—
Belgium/Luxembourg	90	100	155	—	—
Japan	55	50	60	—	—
France	5	120	165	—	—
United Kingdom	5	80	110	—	—
Others	30	40	50	—	—
Total	565	780	1,100	1,400	3,400
TOTAL MARKET	565	780	1,100	1,400	3,400
RAILWAY FREIGHT AND SIMILAR CARS					
United States	90	10	60	70	480
Japan	2	180	100	—	—
West Germany	70	35	70	—	—
Singapore	30	40	40	—	—
United Kingdom	15	10	20	—	—
Australia	10	5	10	—	—
Others	3	10	10	—	—
Total	220	290	310	430	2,520
TOTAL MARKET	220	290	310	430	2,520
RAILWAY PASSENGER CARS					
United States	—	5	10	50	400
Japan	—	6	50	—	—
West Germany	—	4	30	—	—
Australia	12	—	—	—	—
Netherlands	—	1	—	—	—
United Kingdom	—	1	—	—	—
Others	—	1	10	—	—
Total	12	18	100	300	2,400
TOTAL MARKET	12	18	100	300	2,400
RAILWAY LIFTING AND LOADING EQUIPMENT					
United States	160	210	185	150	230
Japan	150	280	205	—	—
West Germany	30	60	55	—	—
Singapore	20	50	40	—	—
United Kingdom	15	30	25	—	—
Netherlands	10	20	20	—	—
Others	15	50	10	—	—
Total	400	700	540	740	880
TOTAL MARKET	400	700	540	740	880
TOTAL MARKET SIZE	7,532	4,011	6,646	9,982	21,640

Source: Official Indonesian and supplier statistics, and estimates based on trade source interviews.

and total sales rose to \$6.6 million that year. Another high sales increase of \$9.9 million is estimated in 1976, and an average annual rate of 21% for the rest of the decade is projected to bring total sales to \$21.6 million in 1980.

Imports supply most of Indonesia's needs for railway transport equipment, although domestic production of some basic machinery is increasing. The workshop in Bandung fabricates steel bridge and other steel structures for the rail system. P.T. Boma Bisma Indra in Surabaya fabricates freight and tank cars. P.T. Moni, in Jakarta produces ball, roller, and plain bearings as well as other railway and tramway components, including shunting and signalling systems, parts and accessories. P.T. Prasuja in Surabaya also produces some railway parts and accessories.

Imports

Trade statistics of Indonesian railway equipment imports reflect sales by a relatively small group of suppliers. Alsthom of France, for example, is negotiating a contract for supply of several locomotives to PJKA, and if the contract is obtained the market share for France may be as high as 90% in the year the locomotives are delivered.

U.S. suppliers of locomotives were leaders in 1975 with a 30% share of the Indonesian import market, followed by West German suppliers who had a 20% share. U.S. manufacturers are expected to maintain this leading position through 1980. Suppliers from West Germany, The Netherlands and the United Kingdom were the leading suppliers of railway self-propelled cars in 1975. Manufacturers from Japan, West Germany, and the United States were the leading suppliers of railway freight cars in 1975. It is estimated that U.S. suppliers of railway freight cars will obtain a 19% share of the Indonesian imports market in 1980.

The main suppliers of Indonesian railway passenger cars are U.S., Japanese, and West German firms. U.S. manufacturers are estimated to maintain a 17% share of this market and are expected to hold this market share in 1980.

West German manufacturers were the main suppliers of railway rolling stock components in 1975 with a 27% market share; French suppliers held a 13% share; and those from the United Kingdom had a 7% share. Leading suppliers of railway fixtures, signals, and controls in 1975 were West German firms with a 45% market share, followed by French and Belgian suppliers with 15% and 14% shares, respectively.

Indonesian sales of railway lifting and loading equipment such as forklift trucks, cranes, and conveyor systems are expected to increase only slightly in the next few years due to the low cost of manual

labor in the country. It is estimated that sales will amount to \$880,000 in 1980. In 1975 Japanese manufacturers were the leading suppliers with a 39% market share; U.S. suppliers were second with a 35% share.

MARKET OPPORTUNITIES

Considering Indonesia's rail transport development plans, a high demand is forecast for diesel locomotives of 1,000 hp to 2,200 hp self-propelled electric cars, passenger cars, freight cars, air brakes and fittings, automatic couplers, running gear, signaling and communications equipment, and rails and rail fittings. Development projects in mining, petroleum and agriculture may also lead to imports of narrow gauge rail equipment.

Depending upon the availability of financing to complete the planned improvements of the PJKA maintenance and repair systems, sales opportunities will develop for machine tools, and specialized railroad workshop and maintenance machinery. There will be some opportunities for sales of railway lifting and loading equipment, but most cargo handling will continue to be done by manual labor.

There is also a growing potential for sales of railway engineering and consulting services.

IMPORT PROCUREMENT

Buyers' Universe

The key buyer of railroad equipment in Indonesia is PJKA (headquartered in Bandung). This organization formulates plans and purchasing programs, which are then discussed and approved by the Directorate-General of Land Transport (and the Ministry of Finance, in the case of large purchases). Most major purchases are made through tenders, and the leading international assistance organizations play a key role in many projects.

Foreign Suppliers' Universe

Major international manufacturers of rail transport equipment are active in the Indonesian market through local or regional representatives.

Leading Suppliers of Self-Propelled Passenger Carriages, Freight, and Passenger Cars, and Parts—

Name	Country
Vereinigung Volkseigener Betriebe	
Schienenfahrzeuge	West Germany
D. Wickham and Co.	United Kingdom
Porter-France H.K., S.A.	France
General American Transportation Corporation	United States

Leading Suppliers of Self-Propelled Passenger Cariages, Freight, and Passenger Cars, and Parts— Continued

Name	Country
Procor Ltd.	Canada
Decauville S.A.	Belgium
Japan Rolling Stock Manufacturing Co. .	Japan
Stabeg Apparatebau GmbH.	Austria
Dominion Brake Shoe Co. Ltd.	Canada
Union Railway Equipment Co.	Canada
Cardwell Westinghouse Company	United States
Railroad Accessories Corp.	United States
Franco-Belge de Material de Chemins de Fer (STE)	France
Linke-Hofmann-Busch GmbH.	West Germany
Waggon Union GmbH.	West Germany

Leading Suppliers of Locomotives

General Electric	United States
General Motors	United States
Alsthom	France
Rhienstahl AG	West Germany
Hitachi Ltd.	Japan
Kawasaki Heavy Industries Ltd.	Japan
Mitsubishi Heavy Industries Ltd.	Japan
Sakai Heavy Industries Ltd.	Japan

Suppliers of Signaling and Switching Equipment Complete Track Systems

Abex Industries of Canada	Canada
Societe de Constructions d'Aiguillages & Appareils de Voie	France
Elektro-Thermit GmbH.	West Germany
Schreck-Mieves KG	West Germany
C.F.I. Group S.A.	Belgium
Kyosan Electric Mfg. Co.	Japan
ML Engineering Ltd.	United Kingdom

MARKETING FACTORS

The most important factors in sales of railroad equipment in Indonesia are credit and price. To complete PJKA's planned program, the Indonesian Government requires suppliers' credits for imports of equipment. Manufacturers who can provide the most advantageous credit conditions will have a strong advantage in the market. Since there will be open bidding on a substantial portion of equipment purchases, price factors will be critical.

PJKA places a high priority on delivery schedules, since excessive delays may result in poor utilization of advisory and consultant resources, and because in view of the planned scrapping of present rolling stock, delays in delivery of replacement equipment could result in deterioration of rail service.

COMPETITIVE POSITION OF U.S. SUPPLIERS

U.S. suppliers are in a strong competitive position to supply diesel locomotives and rolling stock parts to PJKA. In 1976, tenders were called for loco-

tives to be financed by the World Bank. The Crown Agents (U.K.), appointed by the World Bank to make evaluations of the worldwide tenders, ranked General Electric Company of the United States first. The decision was based on price, technical content, delivery, and other factors. PJKA subsequently made its own evaluation and also placed General Electric first, followed by Alsthom of France and Rhienstahl of West Germany. U.S. Export-Import Bank financing has also assisted U.S. suppliers in maintaining their competitive position.

U.S. suppliers of railroad accessory equipment could make a better showing if they were more active in contacts with PJKA. Direct personal contacts with key officials is the most important form of market promotion in the field.

MARINE TRANSPORT SYSTEM STRUCTURE AND SIZE

Approximately 100 million tons of cargo are loaded and unloaded annually at about 300 ports. Major ports include Belawan (Medan), Pangkalan Susu, Palembang, and Dumai in Sumatra; Tanjung Priok (Jakarta), Cirebon, and Tanjung Perak (Surabaya) in Java; Banjarmasin, Balikpapan, and Samarinda in Kalimantan; and Makassar (Ujung Pandang) in Sulawesi. Only 20 ports can serve ships of over 500 dead weight tons (DWT) at quayside. For general cargo, the largest port is Tanjung Priok (Jakarta). The port of Dumai in Sumatra, near the large Caltex oil fields, handles the largest volume of total cargo, accounting for almost half of the yearly tonnage when oil exports are included. Petroleum also accounts for the largest portion of Palembang's cargo tonnage.

Of the 122.5 million tons of cargo handled at Indonesian ports in 1974, about 66% consisted of exports, 9% imports, and 25% interisland trade. Volume is projected to reach 232.6 million tons by 1980, reflecting an average annual growth rate of over 10% during the rest of the decade.

The two largest categories of exports are petroleum and wood. In 1974, exports of petroleum and petroleum products amounted to 60 million tons; wood exports totaled 14 million tons. Other large-volume exports (each over 100,000 tons per year) include bauxite, nickel ore, palm oil, rubber, copper, and coffee.

Import commodities which account for over 1 million tons per year each, include petroleum and petroleum products, rice, fertilizers, and cement. The composition of these imports will change as Indonesia becomes more self-sufficient in fertilizer and cement. Food, iron, and steel imports are expected to become more important in future years.

The main commodities transported in interisland trade are kerosene, sugar, rice, and salt.

Shipping Fleet

Indonesia's shipping fleet is rather small and outdated, and carries only a small portion of the country's total cargo. Just over 1,300 vessels comprised the country's fleet in 1974.

Of Indonesia's 45 oceangoing ships in 1974, 22 were in the 5,001 to 10,000-DWT range, and 19 were over 10,000 DWT. Of 259 vessels for interisland trade, 150 were less than 1,000 DWT; 105 were in the 1,001- to 5,000-DWT range. Only four vessels were in the 5,001- to 10,000-DWT range.

In 1974 most ships in the Indonesian fleet were very old; only 2 ocean-going and 14 interisland ships were less than 5 years old. Twenty-five of the oceangoing ships and 153 of the interisland ships were over 15 years of age in the same year.

Of the 45 oceangoing ships flying the Indonesian flag in 1974, 32 were owned by Indonesians. The remainder were on hire-purchase contracts or chartered.

Of 34 tankers used by Pertamina, the government petroleum corporation, 11 were owned by the corporation in 1975; the remainder were on hire-purchase contracts or term charters.

In 1972, Indonesia had oceangoing vessels with a total of 467,000 DWT. As a result of a government fleet rehabilitation program some of these ships were taken out of service in 1973. In spite of this decline in fleet size between 1972 and 1974, the cargo carried by oceangoing vessels increased from 6.9 million tons in 1972 to 10.9 million tons in 1974.

During the first 5-year national development plan ending in March 1974, 67 vessels on interisland routes owned by 26 shipping companies were rehabilitated. The total volume of this rehabilitation amounted to slightly over 100,000 DWT. As a result of the retirement of old vessels, the actual number of the interisland fleet declined from 282 in 1972 to 259 in 1974. Interisland cargo volume increased from 3.7 tons per DWT in 1969, to 10.6 tons in 1973, and 11.5 tons in 1974.

Special cargo vessels such as log carriers, oil tankers, and other bulk cargo vessels (for cement, fertilizer, asphalt, etc.) play an important role in Indonesia's shipping. In 1974 there were 85 special cargo vessels with 1,540,000 DWT, up from the 45 vessels and 1,143,000 DWT in 1973. The special cargo fleet has been growing very rapidly; capacity increased from 121,568 DWT in 1972 to 1.1 million DWT in 1973, and grew another 35% during 1974. This dramatic growth reflects the trend for Indonesian shipowners to transport a greater share of the nation's special cargo. For example, the Indo-

nesian National Shipowners' Association (INSA) made an agreement with Japan to increase Indonesian participation in the transport of logs, which had been dominated by the Japanese. The Indonesian association negotiated an increase from 5% participation in 1976 to 20% in 1979.

Coastal shipping plays an important role in serving small Indonesian ports and in transporting cargo to large ports for transshipment on oceangoing vessels. In 1974, 965 coastal ships carried 228,244 tons of cargo.

A large volume of cargo shipped among Indonesia's 13,000 islands is transported by merchant sailing ships. According to research conducted by Indonesia's Department of Communications, the five major harbors for sailing vessels located at Ujung Pandang, Banjarmasin, Surabaya, Gresik, and Jakarta have about 15,000 sailing ships registered, with a total volume of 1.6 million cubic meters and a potential load capacity of 400,000 metric tons. Total cargo carried by sailing ships from the five major ports reached 2.4 million tons annually in the mid-1970's. These wooden hulled sailing ships have a 100-ton capacity. Many sailing ships are gradually being powered by diesel engines.

Shipping Firms

Shipping firms range from the national flag carrier, P.T. Djakarta Lloyd, to small domestic companies which offer unscheduled ferry and transport service among the outer islands (see appendix I). The Indonesian National Shipowners' Association lists six oceangoing shipping lines, 46 interisland shipping lines, 142 local service shipping lines which are limited to ships of 175 gross tonnage for voyages up to 200 sea miles, and 35 special service shipping lines.

Shipping firms owned by the Government include the following:

P.T. Djakarta Lloyd

P.N. Pelni (Perusahaan Pelayaran Nasional Indonesia)

P.T. Pelayaran Rakjat Indonesia (P.R.T.)

P.T. Pelayaran Jawa Kalimantan

The Government also owns share in other shipping firms.

P.T. Pusri, the State-owned fertilizer company in Palembang, has established a shipping division to distribute fertilizer. The firm contracted with Japanese shipyards to build five fertilizer bulk carriers. The first contract for two ships was awarded to Mitsubishi of Japan and was financed by the World Bank. Each ship is 7,500 DWT and the total cost is \$33 million. The first is to be completed by the end of 1976, and the second in February 1977. The other

three ships are expected to be built by the end of 1977.

Various government agencies are involved in shipping to some extent. For example, the P.T. Admiral Line was founded in 1973 by the Indonesian Army to employ retired Army personnel. The firm has six vessels, used mainly for Indonesian-Japanese shipping.

P.T. Pann (Perkembangan Armada Nasional) was established by the Government and the Indonesian Development Bank to develop both interisland and international shipping. In 1975, the firm signed contracts with domestic shipyards to build three 750-DWT vessels for interisland shipping. The purchase of nine additional vessels is planned for the P.T. Pann fleet.

Major domestic shipping lines include:

- P.T. Samudera Indonesia
- P.T. Djakarta Lloyd
- P.T. Trikora Lloyd
- P.T. Sriwijaya Raya Lines
- P.T. Pelayran Meratus
- P.T. Gesuri Lloyd

P.T. Samudera Indonesia was established in 1964 by a merger of two shipping lines as ordered by a government decree. The company has services to the United States, Europe, Japan, and Australia with Indonesia's fastest ships, such as the MS *Lawanti* (8,316 DWT), MV *Pancaran Sinar* (7,795 DWT), and MS *Pratita* (11,088 DWT). In addition to its own shipping activities, the firm acts as an agent for foreign lines and offers warehousing and forwarding-agent services.

P.T. Djakarta Lloyd, the national flag carrier, offers services to the United States, Europe, Japan, and Australia. With 4,000 employees, including 1,000 seamen, it has warehousing facilities and some domestic shipping services. Founded in 1950, the company has been especially progressive in its shipping activities. The firm's management plans to operate container vessels by 1977. In February 1976, Djakarta Lloyd conducted a feasibility study on containerization, and is converting five of its 18 ships for container use. The conversion, to be done in West Germany, is to cost about \$3.6 million. In 1975 Djakarta Lloyd ships had already transported an average 350 containers, amounting to 10,000 tons per month; in the preceding year, it handled a monthly average of only 200 containers or 6,000 tons.

P.T. Trikora Lloyd has scheduled shipping services to Europe, Japan, and other countries, in addition to the Indonesian ports of Cilacap, Semarang, Cirebon, Panjang, Bitung, Palembang, and Medan.

The bulk of interisland traffic is carried by the shipping line association, Regular Liner Services

(RLS). The leading interisland carrier, P.N. Pelajaran Nasional Indonesia (P.N. Pelni), owned by the Government, has 43 vessels with a total of about 50,000 DWT in RLS. Most other firms associated with RLS have only 2 or 3 ships. RLS revenues have been insufficient to meet regular commitments.

The privately owned P.T. Pelayran Meratus specializes in interisland cargo and passenger transport. The firm began operations in 1954 with one 618-DWT cargo vessel which was bought through a hire-purchase contract with 10-years' credit from the Directorate of Sea Communications. However, the firm was able to pay the loan within 2 years. During 1975 and 1976, Meratus purchased four more vessels of 2,113 DWT, 750 DWT, 980 DWT, and 675 DWT to provide service between Surabaya, Ujung Pandang, and Medan. The firm has prospered by maintaining good service and is planning to purchase three more cargo vessels in the 1,000- to 1,500-DWT range. The company is also considering the purchase of a floating drydock with a capacity for vessels of up to 3,000 DWT for ship repairs.

P.T. Sriwijaya Raya Lines is the oldest domestic shipping company specializing in interisland transport.

Another major shipping firm, P.T. Gesuri Lloyd, has eight ships ranging from 5,000 to 10,000 DWT. Its subsidiary, P.T. Indonesian National Bulk Carriers, has two ships of 5,000 and 6,000 DWT.

Port System

The Indonesian archipelago has a very extensive port system of about 300 registered ports. In addition, small vessels use numerous bays and landings for handling interisland cargo. Of registered ports, 44 are open to foreign trade, and 95 are used mainly for interisland trade. Of the 95 interisland trade ports, 34 handle specific export cargos which are usually shipped in large volume—palm oil, logs, petroleum and petroleum products, bauxite, tin, nickel, etc. Another 160 ports are used mainly for local coastal and small interisland vessels and sailing craft.

The Indonesian Government's plans call for developing a limited number of major ports to serve international trade, many smaller ports for interisland trade, and a large number of third-level ports for local trade.

In 1970 NEDECO, a Dutch consulting firm, outlined a plan for the improvement of 10 ports. Among them, Tanjung Priok (Jakarta), Tanjung Priok (Surabaya), Belawan (Medan), and Bitung were considered for development as major international ports. Other ports in Sumatra, Java, Kalimantan, Sulawesi, and the outer islands were listed for development as interisland cargo handling ports.

Tanjung Priok.—Indonesia's major port, Jakarta's Tanjung Priok, has experienced great congestion and delays in clearing incoming cargo in recent years. Between 1970 and 1975 cargo unloaded at Tanjung Priok increased from 4.3 million tons to 7.2 million tons.

Government revenues from Tanjung Priok operations, other than customs duties, reached \$46 million in 1975, 63% more than the preceding year. Most of these revenues came from fees on cargo stored in warehouses or wharves. Revenue from customs duties and excise taxes at Tanjung Priok amounted to as much as \$34 million per month during 1975.

Tanjung Priok harbor has the following port equipment:

Description	Owner	Quantity
Forklift Trucks		
2.5 to 3 ton	Port	72
5 ton	Port	4
15 ton	Port	1
1.5 to 10 ton	Private	190
Mobile Cranes		
5 ton	Port	4
3 to 20 ton	Private	14
Portal Cranes, 3 ton	Port	11
Floating Cranes		
15, 60, and 200 ton	Port	3
50 ton	Private	1

In 1976 Indonesia's first container freight station was opened at Tanjung Priok harbor. The station, built at a cost of about \$1 million, can accommodate 6,000 tons of cargo and 254 containers with chassis or 400 containers without chassis. Construction was done through a cooperative arrangement between the cargo forwarding agency, P.T. Trisari, and the shipping company, P.T. Djakarta Lloyd.

New cargo storage areas are planned about 10 km from Tanjung Priok at the Cakung Warehouse project. The project covers an area of 173 hectares and includes 20 large general warehouses with a capacity of 280,000 tons each, 8 warehouses for the Government Logistics Board with a capacity of 112,000 tons each, and 8 warehouses for inflammable commodities with a capacity of 28,000 tons each. In addition to the covered area, the Cakung Warehouse Project has 64,680 square meters of open storage area, including 23,400 square meters for containers, which could accommodate 4,500 containers of 40-foot size. Open storage area of 75,000 square meters is also available for general cargo; but this area may be extended to 671,329 square meters.

Cilegon.—According to government plans, Cilegon port is expected to handle an increasing portion of Tanjung Priok cargo. The channel into the port is being widened from 6 to 12 meters and deepened from 2.5 to 5 meters. The wharf at Cilegon is 600 meters long, and a 100-meter concrete quay and

several warehouses are under construction. Five new forklift trucks, four cranes, a 300-hp tugboat, and six barges have been purchased recently for Cilegon port.

Tanjung Perak.—During the colonial period, Surabaya was Indonesia's industrial and commercial center, and the city's port, Tanjung Perak, was the colony's major shipping center, as well as the main base for the Dutch navy in Indonesia. In the post-independence period, Surabaya lost its preeminence in trade to Jakarta. The port now handles the country's second largest volume of dry cargo. Total cargo discharged and loaded at Tanjung Perak was 3.2 million tons in 1973, the latest year for which figures have been published. The port's cargo handling facilities in 1974 included:

Description	Capacity	Quantity
Floating Crane	50 ton	1
Electric Cranes	3 ton	5
Electric Cranes	5 ton	3
Electric Cranes	1.5 ton	2
Forklift Trucks	1.5 ton	2
Forklift Trucks	1-5 ton	106
Mobile Cranes	3 ton	2
Gantry Crane	5 ton	1
Tractor Cranes	2 ton	2

About 510 trucks operate in the port; 503 of these are privately owned, and the other 7 are owned by the port administration. An Asian Development Bank (ADB) loan of \$5.5 million was approved in 1972 to replace obsolete equipment at Surabaya port. First tenders were announced in 1974; Singapore suppliers obtained \$2.5 million worth of orders, Japanese \$2.1 million, West German suppliers \$200,000, and Dutch suppliers \$1.1 million. In 1975 the port administration purchased:

Description	Capacity	Quantity
Forklift Trucks	2.5 tons	80
Forklift Trucks	5 tons	10
Mobile Cranes	25 tons	2
Mobile Cranes	15 tons	10
Trailer Cranes	20 tons	3
Towing Tractor	3 tons	1
Pilot Boats	250 hp	2
Tug Boats	1,500 hp	2

In 1976 roadways and aprons were repaired and upgraded; a river bank was rehabilitated; rubber and wood docking fenders were installed; and electric cables, cranes, forklifts, truck trailers, a fire engine, and equipment for the water supply were purchased. Future plans call for purchase of a 50-ton floating crane and 12 barges.

Belawan.—At the Belawan port of Medan, there are 8 berths for oceangoing vessels, 11 for inter-island vessels, and 4 for local traffic. The port now has mobile cranes of 6- and 15-ton capacity, 47 forklift trucks, and 86 forklifts owned by private firms.

There is an immediate need for 250 additional fork-lift trucks and another 250 by 1980. There is also a requirement for three tugboats of 500-hp each to supplement the 800-hp tugs currently used. Plans call for moving the oceangoing traffic to a new area and converting the existing facilities to accommodate interisland shipping. Five berths are planned to be constructed in the new area during the first phase, 1977 to 1983. A container yard with three berths would be built in the second phase, 1983 to 1988, and a special jetty is planned so that palm oil may be loaded in tankers.

Cilacap.—The port of Cilacap, located on the South Java coast, is one of the nation's fastest growing ports, and it is expected to play an increasingly important role in providing access to the Indian Ocean. A new oil refinery was completed in the area in 1976, large shipments of iron sands are being made; a fertilizer bagging facility is in operation, and a cement plant is under construction. The number of ships calling at the port increased from 252 in 1974 to 337 in 1975, while the cargo handled grew from 186,000 tons to 339,000 tons.

The Cilacap port administration owns the following equipment:

<i>Equipment</i>	<i>Year Purchased</i>	<i>Capacity in Tons</i>
1 <i>Praha</i> Elan Mobile Crane (Czechoslovakia)	1973	8
1 <i>Tadano</i> Mobile Crane (Japan)	1975	10
1 <i>Takano</i> Mobile Crane (Japan)	1975	15
2 <i>Komatsu</i> Forklift Trucks (Japan)	1975	5
3 <i>Toyota</i> Forklift Trucks (Japan)	1975	3
2 <i>Komatsu</i> Forklift Trucks (Japan)	1971	2.5
1 <i>Clark</i> Forklift Truck (U.S.) ..	1954	2
2 <i>Clark</i> Forklift Trucks (U.S.) ..	1976	5
2 <i>Clark</i> Forklift Trucks (U.S.) ..	1976	7.5
1 <i>Clark</i> Forklift Truck (U.S.) ..	1976	10
1 <i>Clark</i> Forklift Truck (U.S.) ..	1976	15

Private firms at the Cilacap port own the following equipment:

<i>Equipment</i>	<i>Number of Units</i>
Cranes	
400 ton	3
500 ton	2
100 ton	1
350 ton	2
800 ton	1
1,000 ton	1
Forklift Trucks	
3 ton (Komatsu)	1
3 ton (Toyota)	2
3 ton (Yale)	2
5 ton (Masz, USSR)	2

Regulation and Control

The Indonesian Government regulates shipping, promotes the rehabilitation of the fleet, and directly owns some shipping lines. Under the Department of Communications, the Directorate-General for Sea Communications is responsible for matters involving shipping regulation. Its address is: Directorate-General for Sea Communications, Department of Communications Jl. Merdeka Timur 5, Jakarta, Indonesia.

The Indonesian National Shipowner's Association (INSA) represents shipowners in discussions with the Government and other trade associations. Its address is: Indonesian National Shipowner's Association, Jl. Bungur Besar 54, Jakarta, Indonesia.

The Joint Operational Body of Inter-Island Shipping (BAPBERPAN), under INSA authority, establishes regular liner service routes and sailing schedules and issues operating licenses, subject to the Government's approval.

MARINE TRANSPORT TRENDS, PROGRAMS, AND PROJECTS

The second 5-year development plan calls for both expansion of national fleets (see figure 1) and rehabilitation and development of ports.

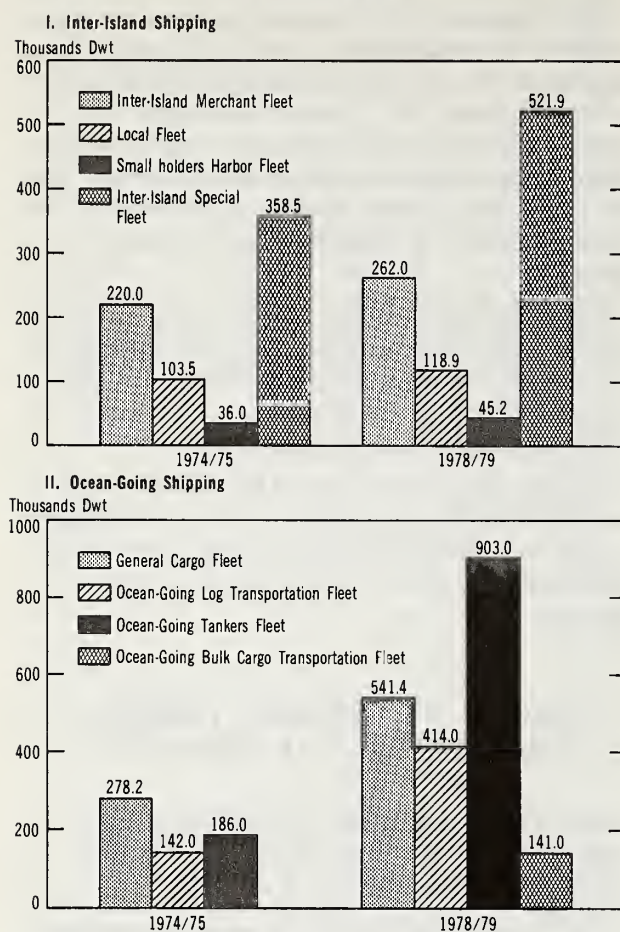
For the ocean-going fleet, the current plan would expand the general cargo fleet from 278,300 DWT to 541,400 DWT, the log transport fleet from 142,000 DWT to 414,000 DWT; and the tanker fleet from 186,000 DWT to 903,000 DWT. The ocean-going bulk cargo fleet is scheduled to be built up to 141,000 DWT.

Investments to improve overseas shipping services are scheduled as shown below:

<i>Service</i>	<i>\$ Millions</i>
Europe	112.4
United States	102.9
Japan	78.9
Australia	3.6
Oil	233.3
Timber	184.5
Other bulk cargo	45.9

The current national plan calls for improvement of interisland shipping by increasing capacity of the interisland fleet from 220,000 DWT to 262,000 DWT, the coastal interisland fleet from 103,500 DWT to 118,900 DWT, and the interisland special cargo fleet from 358,600 DWT to 521,900 DWT.

Figure 1.—Indonesia: Repelita II, Marine Fleet Development Program, 1974/75-1978/79



Source: Repelita II

Under the plan, investments are as follows:

Description	\$ Millions
Regular liner service	88.0
Interisland national oil shipping	65.5
Interisland fertilizer shipping	11.8
Interisland asphalt shipping	9.2

The current plan also covers port rehabilitation and development. Construction of quays, breakwaters, and electrical systems are planned; and improvements in warehouses, water treatment facilities, loading/unloading equipment and harbor dredging are programmed.

Proposed Projects

Projects proposed by BAPPENAS (The National Development Planning Agency) in line with current plan goals for marine transport include improvements in ports and river navigation systems, purchases of ferries and oceangoing ships, and rehabilitation of dockyards.

The river conservancy project proposes to expend

\$4.4 million for purchase of river survey boats, special boats for removing snags, and beaconing boats for use on the Musi and Batanghari Rivers (Sumatra). This project is to improve navigability, safety, and maintenance of river systems; ensure proper conservation; and encourage economic development in the areas of the two navigable rivers. Navigational improvements in the two river systems are expected to result in cheaper, more reliable, and safer waterway transport; and inducement to economic development and transmigration.

Another planned project is the rehabilitation and improvement of marine aids to navigation, which is based on studies done by foreign specialists. The studies included a feasibility study done by U.S. consultants in 1969. A survey done by the Japan Maritime Safety Agency in 1970, and an interim report prepared by a Dutch group in 1971. Of the project's \$3.7-million cost, \$3 million is foreign exchange.

Under another proposal, the replacement of ocean-going fleet project, two new ships would be added to the fleet of P.T. Jakarta Lloyd at a cost of \$40 million.

A proposed project for improvement of ferryboat service includes the purchase of four vessels at a total price of \$4.2 million, of which \$4 million is foreign exchange cost. One ferry would be used for service between the islands of Bali and Lombok, a distance of 30 miles. Another would serve the heavily traveled Bali Strait between East Java at Banyuwangi and Bali at Gilimanuk, a distance of 4 miles. These ferries would provide a continuation of rail and road routes from Surabaya. Another ferry would be used for service between Pontianak and Samarinda in Kalimantan, a distance of several hundred miles.

Equipment to improve efficiency of docking and cargo handling will be required for various ferry ports and river harbors. The planned ferry and river harbor equipment project schedules the purchase of the items listed below:

Equipment	Number of Units
Forklift trucks	
3 ton	10
5 ton	10
Mobile Cranes	
5 ton	4
10 ton	3
Mobile Firefighting Units	4
Towing Tractors, 10 ton	10
Light Beacons	25
Conveyors	3
Floating Cranes, 50 ton	3
Diesel Generators, 150 kVA	10

Total budgeted cost of the project is \$1.1 million; of this amount, \$1 million is the foreign exchange cost.

The planned projects for rehabilitation and development of six ports will rely heavily on international assistance for implementation, and include specific programs for improving port facilities, dockyards, and towing services.

The plans include the purchase of eight 800-hp tugboats to speed towing services. Equipment for this \$10.5-million project is to be financed by both the Government and foreign sources.

External Assistance

In mid-1976, a number of proposed investment and construction projects had been funded; many others were awaiting funds or approvals (see table 7). A \$986-million 5-year replacement and rehabilitation program for oceangoing ships had not been fully funded. Another project for purchase or rehabilitation of vessels constituting 44,600 DWT is still under study and not funded. A project for overseas shipping of timber was approved in 1974, but by mid-1976 implementation had just begun. A project for overseas shipping of bulk cargo, budgeted at \$46 million in 1976 was approved, but funding sources were still pending.

In 1975, the World Bank (IBRD) approved funding for the first phase of a major development program, budgeted at \$70-million, for Tanjung Priok Port, Jakarta. A master plan for the harbor was prepared by Swan Wooster of Canada; bidding on equipment needed for port development started in April 1976. Included in the list of equipment were several types of materials handling equipment, such as two 40-ton shiploader container cranes, estimated to cost \$2.5 million, and forklift trucks valued at \$40 million.

In 1972, the ADB also approved a \$5.5-million loan for development of the port of Surabaya, Tanjung Perak. Plans call for expansion of the port's cargo capacity from 4 million to 12 million tons per year. In 1976 the ADB was qualifying engineering firms for doing the feasibility study for the expansion project. In the first phase of the project a container cargo handling area, an oil terminal, and water treatment facilities will be constructed. This project is expected to be delayed, due mainly to the financial crisis of Pertamina, the national petroleum corporation.

The Indonesian Government is contemplating a change in the organizational status of the ports of Tanjung Priok, Tanjung Perak, and Belawan by converting them into State-owned corporations, in order to improve control and simultaneously allow a greater degree of autonomy in administrative and operational matters. This change would also provide for better implementation of development programs by the port authorities.

In 1972 the World Bank made a loan of \$8.5 million for interisland fleet rehabilitation. In 1976, however, about \$3.8 million of that loan had not yet been disbursed. Due to substantial cost increases, only about half of the vessels is expected to be rehabilitated. In addition, during 1976 the Indonesian Government obtained three large loans for purchase of ships, including a World Bank loan of \$54 million for the acquisition of 94 new and used interisland ships amounting to a total of over 100,000 DWT.

In 1976 the Government of Norway granted a \$90.2 million loan for the purchase of 20 new ships to be built in Norway and several tugboats to be built in Indonesian shipyards. A contract between P.T. Pann and Northwest Engineering of Norway covers construction of the 20 ships, a total of 26,650 DWT valued at \$67 million, to be built in Norway. The ships include five cargo-passenger vessels of 950 DWT each, five cargo vessels of 980 DWT each, five cargo vessels of 1,750 DWT each, and five passenger vessels of 1,650 DWT each. Delivery of the vessels was slated to start in 1977.

Another loan from the Japanese Overseas Economic Corporation Fund for \$25 million will finance seven ships to be built in Japan of 750 DWT each, and five ships to be built in Indonesia of about 1,000 DWT each.

Private Investments

In 1975 private domestic investment applications by five shipping lines totaled \$37 million. Two Japanese firms entered into joint ventures with Indonesian firms for special shipping services; their total proposed investments were valued at \$16.9 million.

MARINE TRANSPORT GROWTH PROSPECTS

The growth of the marine transport system is closely tied to industrial development, and as industrial development expands to the remote regions of Indonesia, financing is expected to be available from government, international, and private sources to support fleet expansion and port development.

Although Indonesian export tonnage far exceeds import and interisland shipping tonnage, imports grew at the fastest rate during the national 5-year plan ending in 1974 (Repelita I). Indonesian import tonnage is expected to grow at a rate of 15% per year during the current 5-year national plan ending in 1979. Export tonnage registered an average annual growth rate of 17% during Repelita I, a rate which is estimated to drop to 13% per year during the current plan period. Interisland traffic grew at

Table 7.—Indonesia: Major Marine Transport Projects Planned or Underway

Project	Estimated Cost (\$ Million)	Funding Source ¹	Project Agreement Date	Status ²	Addresses of Key Contacts
Five-Year Replacement/Rehabilitation Program for Ocean-Going Fleet	986	—	—	—	Directorate General for Sea Communications Jl. Merdeka Timur 5 Jakarta. Tel: 48708. Drs. Amdarto. Tel: 49407 P. T. Pengembangan Armada Nasional (P.T. Pann) Jaya Bldg., 9th Floor Jl. M. H. Thamrin Jakarta. Tel: 357841
Interinsular Service (RLS Fleet) 133,000 DWT	88	IGGI/GOI/IBRD, etc.	1973	a 65%	Do.
Interinsular Shipping of Natural Oil, 218,234 DWT	66	Do.	1974	c	Pertamina (Drs. Soekotjo) Jl. Tanah Abang II/365 Jakarta Tel: 46691.
Interinsular Shipping of Asphalt, 11,500 DWT	9	Do.	1974	a 25%	Perusahaan Aspal Negara (PAN). Jl. Wijaya I/63 Kebayoran Baru Jakarta. Tel: 74501
Local Shipping, 44,600 DWT	30	—	1976 for study	d	Directorate General for Sea Communications Do.
People's Shipping, 35,500 DWT	4	IGGI/GOI/IBRD	1976 for study		
Overseas Shipping for Europe Destinations, 187,282 DWT	112	Do.	1974	a 80%	Do.
Overseas Shipping for U.S. Destinations, 171,537 DWT	102	Do.	1974	a 25%	Do.
Overseas Shipping for Japan Destinations, 132,465 DWT	79	Do.	1974	a 85%	Do.
Overseas Shipping for Australia Destinations, 6,000 DWT	4	Do.	1974	a 20%	Do.
Overseas Shipping of Oil, 933,370 DWT	233	Seeking	Uncertain	c	Do.
Overseas Shipping of Timber, 369,000 DWT	185	IGGI/GOI/IBRD	1974	a 1%	Do.
Overseas Shipping for Bulk Cargo 183,600 DWT	46	Do.	1976	c	Do.
Dockyards	28	Do.	1976	c	Do.
Harbor Expansion	277	—	—	—	Do.
Tanjung Priok, Phase I Program, Jakarta ..	70	Port Authority and IBRD	1975	a 5%	(Ir. J. Boediardjo. Tel: 48963) Tanjung Priok Port Administration (Mr. Habibi) Jl. Raya Pelabuhan 9 Jakarta. Tel: 291233
Tanjung Perak, Surabaya, Port Improvements	42	ADB	1978	c	Directorate-General for Sea Communications Do.
Belawan, Medan, Port Improvements	93	ADB	1978	c	Do.
Cirebon, West Java, Port Improvements	10	Seeking	Study	c	Do.
Semarang, Central Java	17	Seeking	Do.	c	Do.
Teluk Bayur, Padang, Port Improvements ..	5	Seeking	Study	c	Directorate-General for Sea Communications
Tanjung, 2d Stage, Surabaya, East Java	40	Seeking	Study	c	Do.

¹ Funding Sources: IGGI (Intergovernmental Group on Indonesia), GOI (Government of Indonesia), IBRD (International Bank for Reconstruction and Development), ADB (Asian Development Bank)

² Status code: a=underway, completed—percent, b=approved but not started construction, c=pending, d=uncertain.

Source: Directorate-General of Sea Communications.

the rate of 16% per year during the first plan period, and is expected to grow at about 12% per year during the current plan period. The capacity of the inter-island shipping fleet is projected to grow by about 32% during the current 5-year planning period.

Plans for the marine transport industry in Indonesia are ambitious, but it seems certain that all plan goals will not be fully met in view of the fiscal crisis of Pertamina, the national petroleum corporation, and the subsequent tight money policies of the Government. However, the worldwide slump in the ship-building industry during 1975-76 provides Indonesia

with excellent opportunities to obtain ships at reasonable prices and on good credit terms. A substantial portion of Indonesian ship purchases is expected to be financed by attractive government-to-government loans.

MARINE TRANSPORT MARKET SIZE

In recent years the Indonesian market for marine transport equipment has grown rapidly (see table 8). In 1975, sales totaled \$55.9 million, including \$50.4

Table 8.—Indonesia: Size of Market for Marine Transport Equipment
(U.S. \$000)

	1973	1974	1975	1976	1980
SHIPS AND BOATS					
Domestic Production	200	230	420	670	3,500
Imports	—	—	—	—	—
United States	130	3,560	1,000	1,300	3,700
Japan	2,690	25,530	39,000		
Singapore	2,270	3,700	7,000		
Netherlands	310	3,440	800		
Austria	1,510	240	100		
Norway	50	50	70		
Others	1,840	780	2,000		
TOTAL	8,800	37,300	49,970	66,600	190,000
Exports	—	—	—	—	—
	9,000	37,530	50,390	67,270	193,500
MARINE INSTRUMENTATION					
Domestic Production	—	—	—	—	—
Imports	—	—	—	—	—
United States	200	40	40	50	70
Japan	150	150	180		
United Kingdom	50	130	130		
Netherlands	20	50	50		
Singapore	10	10	10		
Canada	—	10	10		
Others	50	120	120		
TOTAL	480	510	540	570	900
Exports	—	—	—	—	—
	480	510	540	570	900
MARINE ENGINES					
Domestic Production	—	—	—	—	—
Imports	—	—	—	—	—
United States	440	900	1,120	1,400	3,300
Japan	1,100	1,600	1,900		
United Kingdom	180	120	300		
West Germany	160	320	350		
Australia	100	60	30		
Denmark	20	80	120		
Others	100	120	20		
TOTAL	2,100	3,200	3,840	5,010	11,880
Exports	—	—	—	—	—
	2,100	3,200	3,840	5,010	11,880
MARINE TRANSPORT LIFTING AND LOADING EQUIPMENT					
Domestic Production	—	—	—	10	200
Imports	—	—	—	—	—
United States	40	50	80	300	1,200
Japan	80	230	550		
West Germany	50	20	150		
Netherlands	—	30	90		
Singapore	8	10	40		
United Kingdom	10	10	50		
Others	12	150	240		
TOTAL	200	500	1,200	2,310	6,670
Exports	—	—	—	—	—
	200	500	1,200	2,310	6,670
TOTAL MARKET SIZE	11,780	41,740	55,970	75,160	213,150

Source: Official Indonesian and supplier statistics, and estimates based on trade source interviews.

million of ships and boats, \$500,000 of marine instrumentation, \$3.8 million of marine engines, and \$1.2 million of marine transport lifting and loading equipment. Total sales more than doubled from 1973 to 1974, mainly as a result of major ship purchases. Between 1976 and 1980 annual growth is expected to average about 30%, bringing sales to \$213 million.

Ship and boat sales are expected to increase rapidly in future years. These sales quadrupled from \$9 million in 1973 to \$37 million in 1974, and are estimated to be about \$67 million in 1976. By 1980, annual sales of ships and boats are projected to reach \$193 million.

Marine engine sales increased 52% from 1973 to \$3.2 million in 1974, and another 20% in 1975 to \$3.8 million. In 1976 a 30% increase in sales is estimated, bringing the market to \$5 million. Between 1976 and 1980, increases in these sales are projected to average about 24% per year.

Indonesian sales of marine transport lifting and loading equipment were \$200,000 in 1973. In 1974 sales rose to \$500,000, and doubled in 1975 to \$1.2 million. These rapid increases reflect purchases for port rehabilitation and development projects. Sales are estimated to nearly double in 1976 to a total of \$2.3 million, and annual growth between 1976 and 1980 is projected to average about 30%.

Imports

Japanese suppliers lead in sales of ships and boats to Indonesia; their market share was 78% in 1975. Singapore shipbuilders hold the second largest market share, 14%. Attractive sales offers are expected to increase market shares of Singapore and Norwegian suppliers by 1980, primarily at the expense of the Japanese.

Japanese and U.K. firms lead in supplying Indonesian marine instrumentation imports, with 33% and 24% market shares respectively in 1975. Slight decreases in these shares are projected for 1980.

Marine engines have been imported mainly from Japan and the United States. In 1975 Japanese suppliers had a 49% share of these imports; while U.S. suppliers had 29%. These shares should remain the same through 1980.

Marine transport lifting and loading equipment is imported mainly from suppliers in Japan, West Germany, the Netherlands, and the United States. In 1975, market shares were: Japanese suppliers—46%, West German suppliers—13%, Dutch suppliers—8%, and U.S. suppliers—7%. The U.S. suppliers' market share is expected to rise to about 18%, by 1980.

Domestic Manufacturing

Indonesian ship and boatbuilding is expected to grow rapidly in future years. Sales of domestically built ships and boats were estimated at \$420,000 in 1975, and are projected to reach \$3.5 million by 1980. (For additional information on shipbuilding and repair see Metallurgical and Metalworking Industries.)

Some growth is expected in Indonesian manufacturing of marine cargo lifting and loading equipment, such as cranes and hoists. This production is expected to reach a value of \$200,000 by 1980. One new manufacturer of this equipment is a joint venture between a Danish trading firm, Jebsen and Jensen, and P.T. Tiga Ikan to produce Demag hoists. The initial investment for the joint venture, approved in 1976 by the Capital Investment Coordination Board (BKPM), amounts to \$1.5 million. The manufacturing plant is to be located in the Rungkut Industrial Estate in Surabaya.

There are no Indonesian exports of marine transport equipment.

MARKET OPPORTUNITIES

Opportunities for sales of ships and boats in Indonesia will be substantial during the next several years. The range of ships and boats in demand will include ocean-going ships, petroleum tankers, log transport ships, bulk cargo ships, container ships, passenger ferries, and a variety of river craft, such as special boats for negotiating shallow waters.

Cargo handling equipment with good sales potential includes forklift trucks, cranes, grain handling and loading equipment, conveyors, and bucket elevators. Large numbers of forklift trucks will be required in a number of ports as traffic volume increases and port development projects are implemented.

As container traffic grows, tractors, trailers, and 30-ton forklift trucks will be required. Forklift trucks with head spreaders are preferred to straddle carriers in Indonesia, since the latter interfere with other traffic on aprons. As most ports in Indonesia have multipurpose berths, a tractor and trailer system with forklift trucks for loading is the most practical system for container handling.

Growth of the local shipbuilding industry and the continued conversion of sailing craft to motorized power will boost demand for a wide range of marine engines for use on vessels up to 300 DWT.

Government and international assistance programs emphasize development of the Indonesian fishing industry (see Food Processing and Packaging Invest-

ments for this development is projected to expand sales in the marine industry).

As industrial and agricultural development spread to the outer islands, a good market will develop for small vessels to transport cargo to other Indonesian locations, as well as for fast river vessels to provide rapid passenger transportation.

The Indonesian market for private pleasure craft should not be overlooked. Indonesia has a large group of business executives and wealthy citizens who are purchasing pleasure craft. The country's hot, tropical climate is ideal for water sports, and the abundance of coastline and rivers create a market for a wide range of moderate to expensive craft.

IMPORT PROCUREMENT

Buyers Universe

Key buyers of marine transport equipment in Indonesia include: (1) government organizations, such as shipping firms, the Directorate-General of Sea Communications, and the port administrations; (2) private inter-island and ocean-going shipping firms; (3) fishing and coastal cargo shipowners; and (4) nonshipping businesses and private individuals. Purchasing by government organizations and shipping firms is often dependent upon obtaining financing and contract bidding is subject to rules laid down by the Indonesian Government and foreign lending institutions.

Private inter-island and ocean-going shipping firms are often inexperienced with regard to their equipment needs and require educational sales efforts. This is also true of fishing and small coastal cargo shipowners.

Foreign Suppliers Universe

Most shipbuilders and brokers operate from shipyards and home offices located in Japan, Singapore, Europe, or the United States. Suppliers of marine engines and marine cargo handling equipment generally sell through established Indonesian sales representatives and distributors.

Leading Suppliers of Ships and Boats

<i>Name</i>	<i>Location</i>
Arhus Flydedok A/S	Denmark
Aalborg Vaerft A/S	Denmark
Blohm and Voss AG	West Germany
Hitachi Shipbuilding and Engineering Co. Ltd.	Japan
Ishikawajima-Harima Heavy Industries Co. Ltd.	Japan
Kawasaki Heavy Industries Ltd. .	Japan
Mitsubishi Heavy Industries Ltd. .	Japan

Leading Suppliers of Ships and Boats—Continued

<i>Name</i>	<i>Location</i>
Mitsui Shipbuilding and Engineering Co., Ltd.	Japan
Sumitomo Shipbuilding and Machinery Co.	Japan
Hyundai Shipbuilding and Heavy Industries Co. Ltd.	Korea
P. Smit Jr. B.V.	Netherlands
Rotter Droogdok Mij. B.V.	Netherlands
Drammen Slip and Verksted ...	Norway
Swan Hunter Shipbuilding Ltd. ..	United Kingdom
Vosper Thornycroft Ltd.	United Kingdom
Todd Shipyards Corp.	United States
Bethlehem Steel Co.	United States
Alabama Dry Dock and Shipbuilding Co. Ltd.	United States
Northwest Engineering A/S	Norway

Leading Suppliers of Marine Engines

Alpha-Diesel A/S	Denmark
Burmeister and Wain Engineering Co. Ltd.	Denmark
John Brown Engineering	United Kingdom
Nordberg Mfg. Co.	United States
Daihatsu Diesel Mfg. Co.	Japan
N. V. Werkspoor	Netherlands
Yanmar Diesel Engine Co.	Japan
General Electric Co.	United States
Mitsubishi Heavy Industries	Japan
Klockner-Humboldt-Deutz	West Germany
Sulzer	Switzerland
Niigata Co. Ltd.	Japan
Caterpillar Co.	United States
Cummins Co.	United States

Leading Suppliers of Marine Cargo Handling Equipment

Munch GmbH.	West Germany
Tadano Iron Works Ltd.	Japan
Demag GmbH.	West Germany
Harnischfeger Corp.	United States
Toyo Umpanki Co. Ltd.	Japan
Clark Equipment Co.	United States
Komatsu Co. Ltd.	Japan
Toyota Co.	Japan

MARKET FACTORS

Small forklift truck hoists and other materials handling equipment is normally sold through Indonesian sales representatives and distributors who stock items. Large marine transport equipment, such as ships, and large lifting and loading equipment are normally sold directly by the manufacturer; in some cases, a local commission agent assists in the transaction.

A number of development projects involving purchases of marine transport equipment are done by open bidding subject to World Bank and other international lending agency rules.

Financing factors are very important for large ship sales; the suppliers able to give the best credit terms

will make the sales. In sales of smaller equipment items, such as marine engines and materials-handling equipment, other factors come into play—local service facilities, availability of spare parts, delivery times, and price. Indonesian users seek suppliers with a good performance record on these factors.

The monthly trade journal *Warta Ekonomi Maritim Review*, published by the Maritime Press Foundation, Jl. Raya Pelabuhan, 7, Tanjung Priok, Jakarta, is widely read by decisionmakers in the industry.

COMPETITIVE POSITION OF U.S. SUPPLIERS

U.S. suppliers of ships and boats face strong price and credit competition from Japan, Singapore, and Europe. However, sales opportunities are good for special marine craft such as military boats, tugboats, and other specialized vessels.

U.S. suppliers of marine engines have good potential for sales of medium-range marine engines. A number of U.S. engine manufacturers have already established sales, service and parts facilities in Indonesia for generator sets and other engine equipment, and consequently are well placed to develop the market for marine engines.

Indonesian demand for container handling equipment will grow, and U.S. firms can supply a significant portion of these needs. U.S. suppliers of marine lifting and loading equipment have good potential for sales of heavy duty cranes, forklift trucks, and hoists.

American marine transport equipment suppliers should develop two general approaches to sales promotion: sales efforts directed at large buyer groups such as boatowners and cargo handling firms, and efforts directed at major buyers, such as the port administrations and large shipowners. Trade shows and equipment displays are appropriate for the large user groups, while direct sales contacts and extensive

surveys of equipment needs are required in developing sales to the major buyers.

AIR TRANSPORT SYSTEM STRUCTURE AND SIZE

The air transport system encompasses extensive domestic and international activities. Although domestic air transport represents only about 1% of the total passenger traffic in the country, it is increasingly important as a means of linking the islands and gaining access to their interiors. Air cargo is also growing steadily.

In many segments of the economy, air transport is no longer considered a luxury, since development has spread to outlying islands. Rapid transport to remote areas is a necessity for technicians and materials in oil, mining, and forestry operations. Air transport has improved dramatically during recent years. Commercial flight activities in the country include scheduled and nonscheduled airlines, supplementary operations such as air charter and air taxi services; and general aviation, including aerial photography and survey work, business flying and some agricultural services. There are a number of privately owned aircraft, as well as several flying clubs.

Domestic air transport.—Domestic air travel has grown rapidly in recent years as a result of expanded flight networks, more frequent flights, and general improvement of facilities and infrastructure. Between 1968 and 1975 distance traveled by domestic aircraft increased from 11 million craft/km to 39 million craft/km; the number of passengers grew from 380,000 to 2.4 million (see table 9). Between 1976 and 1980 growth of domestic aircraft flight operations is expected to average 10% per year and reach 61 million craft/km in 1980. The number of passengers transported is estimated to increase at a corresponding rate and amount to 3.9 million in 1980.

International air transport.—In 1975, cargo transported by all carriers on international routes was

Table 9.—Indonesia: Domestic Air Transportation

Description	Actual						Projected			
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1980
Aircraft operations (1,000 craft/Kilometer)	11,218	12,162	16,480	20,458	26,942	31,967	35,077	39,422	43,767	61,145
Passengers transported (1,000's)	382	448	647	965	1,129	1,800	2,228	2,463	2,709	3,967
Cargo transported—(tons)	—	5,295	4,738	8,436	11,179	20,075	23,608	27,583	31,022	47,628
Flying hours	40,636	45,315	54,424	60,979	79,037	82,520	89,866	98,499	107,131	133,029
Available cargo capacity (1,000 ton/Kilometers)	46,195	52,506	80,185	102,494	125,502	203,339	204,405	233,748	263,092	380,465
Actual cargo transported (100 ton/Kilometers)	27,352	34,920	51,055	68,501	82,209	106,727	117,412	133,304	149,195	212,757
Load factor	59%	66%	64%	68%	66%	52%	57%	57%	57%	56%

Source: Central Bureau of Statistics, estimates based on trade source interviews.

17,697 tons, according to industry sources. This figure does not include the figure for private charter air cargo operations for large construction projects and oil companies, which is considerable. For example, oil drilling firms have sometimes found it necessary to charter entire planes to transport urgently needed oil well equipment or pipes from Singapore, the United States, or Japan.

Operations by domestic airlines on international routes have been relatively limited. Between 1968 and 1975, the number of passengers traveling domestic airlines on international routes rose from 69,000 to 122,000 while cargo transported rose from 3,312 tons to 4,224 tons. A 10% average annual increase in traffic is expected from 1975 to 1980; by 1980 the number of passengers should reach 214,000, and cargo traffic 6,803 tons.

Between 1967 and 1971, tourist arrivals grew substantially as the country recovered from a period of political upheaval and economic decline. By 1971 the number of tourist arrivals was 181,100; expenditures by tourists during that year were estimated at \$22.6 million. By 1978 the number of tourist arrivals is expected to reach about 540,000, while tourist expenditures should reach \$94.3 million. Although foreign flag carriers will probably transport most of these passengers, Indonesian carriers will also benefit.

In recent years, Indonesia has had a restrictive, "one gateway" policy of allowing foreign carriers entry into the country through Jakarta only. However, this policy has never been fully enforced, and some foreign carriers enter through Bali. In 1975 a total of 22,656 tourists arrived in Jakarta while 77,463 arrived in Bali. Considering the Indonesian Government's interest in developing tourism, industry sources expect the restrictions to be even further relaxed.

Aircraft Fleet

In 1974, the latest year for which comprehensive fleet information is available, Indonesia had a fleet of 371 planes. The large number of light aircraft such as Cessna, Beechcraft, and Piper reflects the development of supplemental carriers and general aviation. At the beginning of the first national development plan in 1969, the fleet comprised only 169 aircraft, including a large number of vintage Douglas DC-3's and some new Fokker F-27's.

Air Transport Organizations

In 1975 Indonesia had about 25 commercial airlines—six scheduled airlines (including two State-owned lines, Garuda and Merpati), with the remainder engaged in supplemental and general aviation operations.

The six commercial scheduled airlines and their home bases are as follows:

P.N. Garuda Indonesia Airways, Jakarta
P.T. Merpati Nusantara Air Lines, Jakarta
P.T. Zamrud Aviation, Denpasar, Bali
P.T. Bourag Airlines, Balikpapan, East Kalimantan
P.T. Mandala Airlines, Surabaya, East Java
P.T. Seulawah Air Services, Palembang, South Sumatra

Trunklines, called "Nusantara Routes," have been allocated to Garuda and Merpati. While government policy restricts private operators to feeder lines, in practice they often fly the same routes as State airlines.

P.N. Garuda International Airways.—Garuda is the oldest and largest airline in Indonesia. It began in 1954 as a company owned jointly by KLM (Royal Dutch Airlines) and the Indonesian Government. Garuda became a wholly owned government enterprise in 1961.

Garuda operates scheduled services to 27 cities and towns throughout Indonesia and international routes to the Netherlands, Australia, Singapore, Malaysia, Thailand, Hong Kong, and Japan.

In 1974 the firm's fleet consisted of 31 planes. In 1975–76 it added 25 new aircrafts to its fleet, which includes: two Douglas DC-10's, 18 Douglas DC-9's, two Douglas DC-8's, four Douglas DC-3's, 23 Fokker F-28's, and seven Fokker F-27's.

The U.S. Export-Import Bank financed the DC-9 and DC-10 purchases. The DC-8's are the 50 series. The DC-3's are used primarily for cargo transport. The firm plans to gradually phase out its F-27's. Plans call for purchasing two more DC-10's, but this purchase depends upon approval of U.S. routes by the Civil Aeronautics Board (CAB).

Merpati Nusantara Airlines.—Merpati, the largest domestic carrier, started in 1957 when the Indonesian Air Force operated an "air bridge" in Kalimantan, using DC-3, Cessna, B-25, and Otter aircraft. Commercial flights started in 1960, and in 1962 P.N. Merpati Nusantara Airlines was officially designated to serve remote areas of Kalimantan. Initial equipment included five DC-3's, four Otters, two Twin Otters, and one Beaver.

In 1968, the airline was reorganized: it adopted an improved management system and launched a consolidation and rehabilitation program. The result of this reorganization was a steady improvement in the airline's profit. Between 1963 and 1974 the number of passengers carried by Merpati increased from 4,879 to 415,350; the cargo transported rose from 185,000 ton/km to 48,199,000 ton/km. Merpati serves 75 domestic airports and airstrips, many of which are remote and without sufficient communica-

tions equipment for official registration. In 1974 Merpati's income was \$20 million; profit was only \$212,000. In 1975 profit rose to \$1.3 million. As a result of the firm's improved financial condition, Merpati was converted to a limited liability company in 1976. Assets now stand at \$39 million. The company has 1,400 employees, including 88 pilots, 184 technicians, and 88 stewardesses. Plans call for recruiting more technicians and pilots.

In 1976, Merpati added 11 DHC-6 Twin Otter's, a VC-8, and some YS-11's to its fleet which now includes: three Vickers Vanguard VC-9's, 10 Douglas DC-3's, three Vickers Viscount VC-8's, nine Pilatus Porter PC-6's, five Namco YS-11-200's, two Hawker Siddeley HS-748's, two Fokker F-27's, two Dornier DO-28-B1's and nine Twin Otter DHC-6s.

Merpati routes link about 150 large and small towns in Indonesia, and include 16 scheduled domestic routes, and 8 scheduled regional routes servicing Penang and Kuching in Malaysia, Darwin in Australia, and Papua, New Guinea.

Licensed Merpati personnel perform major maintenance up to "D" checks (most thorough of four line maintenance designations: A, B, C, and D) on aircraft at Merpati facilities in Jakarta and Biak, Irian Jaya. Line maintenance bases are in Surabaya, East Java; Denpasar, Bali; and other major points. Often "D" checks are contracted out abroad.

In 1976 Merpati signed a joint lease with Garuda to use the flag carrier's DC-8 equipment for charter operations, which began with a Manila, Philippines to Bali run. However, Merpati plans to purchase its own jets and expand into long-haul, international, scheduled services.

Its plans also call for charter flights from the West Coast of the United States to Bali. For this the firm expects to lease a Douglas DC-8-30 or a Boeing 707-320, and after the first year of operation plans to purchase wide-bodied jets. Aircraft maintenance and passenger ground service are planned to be obtained under contract with major air carriers. Facilities in Los Angeles would be used for heavy maintenance and overhaul. Merpati plans to purchase equipment to service Boeing 707 and Douglas DC-8 aircraft for the Australian, Airline Qantas Airways as well as themselves. A small maintenance and repair facility, with an engine change capability, would be established at Bali.

In late 1975 the Government established the Perintis (pioneer) Airline System, associated with Merpati, to meet the growing requirements of passenger service in remote areas. The United Nations Development Program (UNDP) is assisting the new airline to develop adequate standards of safety, set up regular schedules, and implement efficient operations.

DHC-6 Twin Otter aircraft are used for these flights, which often operate at a loss.

Supplemental carriers.—Rapid development in oil, mining, and forestry has stimulated air charter and air taxi services. In 1970, Pertamina (the national oil company) established a subsidiary, P.T. Pelita Air Services, to serve the petroleum industry. Now the largest air charter company in the country, Pelita operates 79 aircraft, including F-27's, F-28's, HS-748's, YS-11's, and Hughes helicopters.

The following private, joint-venture, air services operate in Indonesia:

<i>Airline</i>	<i>Domestic Partner</i>	<i>Foreign Partner</i>
P.T. Derazona Air Service	P.T. Deraya	Arizona Helicopters Inc. (United States)
P.T. National Utility Helicopters	National Air Charter	Utility Helicopter Inc. (United States)
P.T. Indonesian Air Transport	J.D. Saras	Schreiner Air Transport (Netherlands)
P.T. Bristow Masayu Helicopters	P.T. Masayu	Bristow Helicopter (United Kingdom)

Carriers such as Seulawah and Bourag, who have tried to operate scheduled services, have stagnated in recent years. Some of these firms have attempted to increase their business through international air charter operations. Such operations were authorized by the Minister of Communications in August 1975, provided they do not compete with already established scheduled services. For example, Mandala Airlines started charter operations from Singapore to Bali using aircraft leased from Pelita. This firm plans to expand its capability for chartered flights in order to carry 20,000 to 30,000 tourists annually from Europe.

In addition to the government and commercial airlines, there are a few noncommercial flight operators, such as Aeroclub Indonesia and Associated Mission Aviation, a religious group, which operate light aircraft.

Another firm, P.N. Aerial Survey is a government firm that specializes in survey work.

Airport Infrastructure

Approximately 54 airports are registered with the Directorate-General for Air Communications. However, many of these consist of nothing more than landing strips. In 1975, runways at 35 of Indonesia's airports were surfaced with asphalt, 7 with concrete, 7 with grass, 2 with coral, and 7 with gravel and sand.

Jakarta's Halim Perdanakusuma International Airport and the Ngura Rai Airport in Bali are Indone-

sia's two main international airports. Halim accepts Boeing 747's; both airports take DC-10's. Some international flights, primarily from Malaysia, also land at Medan, Sumatra. In 1974, the country had 5 airports able to take DC-8's, 9 that could accept DC-9's, 18 where F-28's could land, 32 equipped to handle F-27's, and 49 that could accommodate DC-3 aircraft.

Both Halim and Kemajoran (Jakarta's airport for domestic flights) are considered well equipped with both air-to-ground communications systems and navigational aids. Halim, which belongs to the Indonesian Air Force, is equipped with long-range HF-RT, VHF air traffic control, VHF approach control, VHF tower facilities, and VHF radio transceivers. Navigational aids include: ASR Radar, Non-directional beacons, locators, instrument landing systems, VASIS, VORS, and DME.

About 95% of all domestic traffic is handled at less than 20 of the nation's airports. High traffic airports include those at Medan, Pekanbaru, and Palembang in Sumatra; and Jakarta, Jogjakarta, and Surabaya in Java. Turbojets can land at almost all provincial capitals. Gradual upgrading of airports and lengthening of landing strips has increased the number of towns which can be reached by plane as well as the country's capacity for handling aircraft.

Demands on airports have grown rapidly. International departures and arrivals increased at an average annual rate of 24% between 1970 and 1975 and are expected to average 10% growth annually between 1976 and 1980, reaching 52,620 in the latter year. The number of domestic flight departures and arrivals has climbed from 66,184 in 1970 to 261,200 in 1975; between 1975 and 1980 they are projected to increase at an average annual rate of 11%.

AIR TRANSPORT TRENDS, PROGRAMS, AND PROJECTS

The rapid growth of the air transport industry in Indonesia has exceeded estimates in the present development plan, Repelita II. The plan estimates the number of aircraft in Indonesia's fleet at 269 in 1974/75 and at 368 in 1978/79 (see figure 2). In 1975 the total number of aircraft was 371.

In line with the current plan objectives six major projects for airport expansion and improvement have been proposed by BAPPENAS (The National Development Planning Agency) for implementation by 1979. Airport security, ground support maintenance, rescue and firefighting equipment, and rehabilitation as well as upgrading of airport electrical facilities and aeronautical telecommunications are target areas of the six projects.

An expenditure of about \$600,000 is required to maintain and expand security in several airports. Existing equipment is often inadequate, and some airports lack security equipment of any kind.

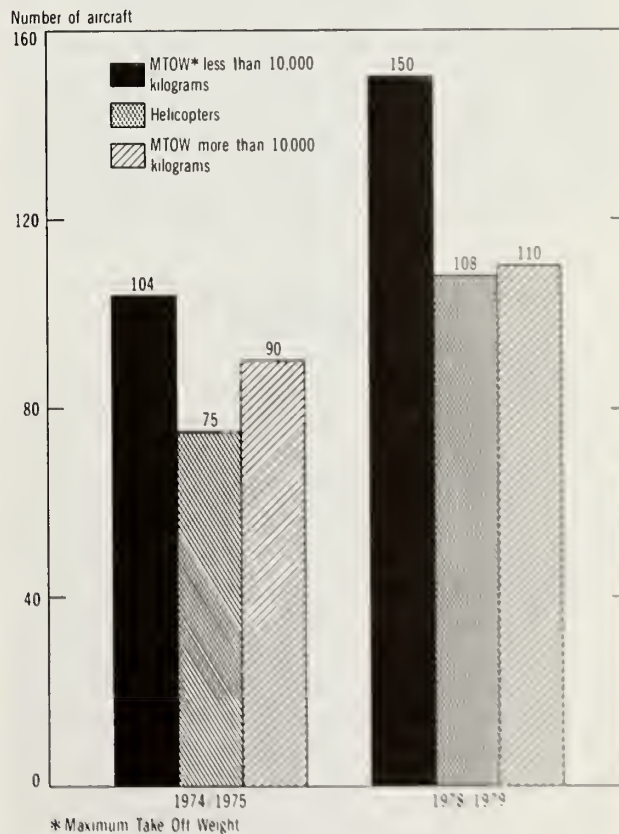
About \$16 million will be spent on maintenance equipment for upkeep of airport runways, taxiways, aprons, shoulders, and overruns.

The equipment used by airport rescue and firefighting services is considerably below international standards. With the expansion of the national aircraft fleet and the use of larger and more expensive aircraft, it is essential that the level of firefighting and rescue services be improved. Of the program's estimated \$12.5-million cost, \$10.5 million is foreign exchange.

Aeronautical telecommunications at 11 airports will be rehabilitated and improved. Most VHF and HF air/ground communications facilities of the aeronautical mobile/fixed services at these airports are antiquated and must be replaced to meet International Civil Aviation Organization (ICAO) standards.

In an effort to improve ground equipment facilities, the Government plans to spend \$6 million for

Figure 2.—Indonesia: Repelita II, Planned Air Fleet Development, 1974/75-1978/79



Source: Repelita II

purchase of hangers, power generating units, ground support equipment, navigational aids, and other equipment for various airports throughout the country.

Several major airport projects that could result in substantial expenditures for equipment in future years are pending. The most ambitious undertaking is the planned Jakarta International Airport at Tangerang, West Java, which would replace Halim Airport. A study, financed by the U.S. Agency for International Development and completed in 1973, concluded that a new airport to serve Jakarta would be required by 1980. In 1975 a master plan was prepared, by a Canadian consultant firm, financed with Canadian aid.

In the first stage, two runways—3,660 meters and 3,000 meters long—are to be built for international and domestic flights, and modern instrument landing systems are to be installed. Construction of this first stage, to start in 1980, will cost about \$867 million.

In 1975 the Tangerang project had been allocated 143 hectares (ha) of the total 2,500 to 3,000 ha of land required. Land requisitions up to 1975 had cost \$1.2 million while expenditures on consulting services were \$1 million. With completion of the first stage of construction in 1985, the new airport will have a daily landing capacity of 250 aircraft.

The Government has completed an agreement with the Schiphol Airport Authority in the Netherlands to begin training Indonesian technical, operational, and administrative executives. In addition, training of air traffic control specialists is planned in order to establish a central control system at the new airport similar to that located in Amsterdam at Schiphol Airport.

AIR TRANSPORT GROWTH PROSPECTS

Current national development plan targets for Indonesia's airplane fleet have been exceeded. However, unless the Government is able to find new sources of revenue it is uncertain whether such projects as the new Jakarta International Airport at Tangerang or the rehabilitation of other airports will be completed by the end of the plan period in 1979.

The fleet expansions and increased flight schedules which occurred during the period of the first national plan and the early years of the current plan left both domestic and international airlines with excess cargo and passenger capacity. Growth in passenger traffic and cargo volume through the end of the current national plan period in 1979 will utilize available space and the acquisition of additional capacity is not expected.

Domestic passenger traffic, which experienced an average annual growth rate of 49% during the first five-year plan is projected to increase at a 10% annual rate during the current plan. Passenger operations are expected to increase in importance and more services will be offered in remote regions as new investment and development spread throughout the country. However, domestic cargo operations, stimulated by the equipment needs of several large construction projects, averaged growth of 80% per year during 1969–74, and are expected to average an annual growth rate of only 14% during 1975–79.

Cargo loaded on international flights increased by an average of 80% per year during 1969–74, and is expected to average an annual growth rate of 51% during 1975–79. By comparison, cargo unloaded grew 71% per year during the first plan period and is expected to experience an average annual growth rate of only 39% during the second plan period. The international airlines expect domestic industrial development to stimulate greater utilization of air cargo capacity.

Airport facilities in Jakarta are adequate for current and projected flight operations well into the 1980's, assuming that the growth of Indonesia's foreign tourism does not exceed present predictions. Tourism growth averaged 29% per year during Repelita I and is expected to drop to a growth rate of 16% annually during Repelita II. However, if the Government changes its policy and opens additional airports to international flights, tourism may grow more rapidly.

AIR TRANSPORT MARKET SIZE

In 1975 the Indonesian market for air transport equipment reached \$84.1 million. Of these sales, \$58 million were of aircraft; \$24 million of aircraft engines and components; \$900,000, airborne avionics equipment; \$500,000, ground avionics equipment; and \$700,000, aviation ground support equipment (see table 10). Except for production of small numbers of light aircraft, primarily by assembly of imported components (see Metallurgical and Metalworking Industries), no air transport equipment is manufactured in Indonesia. From 1976 to 1980 the market is projected to grow at an average annual rate of 25%, increasing from \$81.9 million to over \$203 million. Purchases of replacement aircraft by Garuda and other leading carriers will account for this large increase in the market.

Imports

U.S. suppliers have the largest share of the aircraft market in Indonesia, with 67% in 1975. The Netherlands is the second most important source, with a

Table 10.—Indonesia: Size of Market for Air Transport Equipment
(Thousands of U.S.)

	1973	1974	1975	1976	1980
Aircraft					
Domestic Production	10	20	20	20	100
Imports					
United States	14,190	20,410	38,710	38,500	95,000
Netherlands	23,830	17,230	13,180	—	—
France	4,730	17,900	4,590	—	—
Canada	1,170	1,200	800	—	—
West Germany	—	300	200	—	—
Japan	—	—	—	—	—
Others	—	100	500	—	—
TOTAL MARKET ..	43,920	57,140	57,980	54,500	134,500
Aircraft Engines and Components	43,930	57,160	58,000	54,520	134,600
Domestic Production					
Imports					
United States	7,460	9,590	11,130	11,600	31,110
Netherlands	4,870	4,560	4,950	—	—
United Kingdom	2,280	2,290	3,710	—	—
Canada	2,220	1,400	2,470	—	—
France	480	580	740	—	—
Japan	300	140	490	—	—
Others	390	170	510	—	—
TOTAL MARKET ..	18,000	18,730	24,000	24,840	63,100
Airborne Avionics Equipment	18,000	18,730	24,000	24,840	63,100
Domestic Production					
Imports					
United States	190	160	730	840	1,690
United Kingdom	120	50	60	—	—
Netherlands	60	20	70	—	—
France	50	20	30	—	—
Canada	10	10	10	—	—
Japan	10	20	10	—	—
Others	10	10	10	—	—
TOTAL MARKET ..	450	290	920	1,050	2,110
Ground Avionics Equipment	450	290	920	1,050	2,110
Domestic Production					
Imports					
United States	50	170	200	280	770
Japan	60	50	90	—	—
United Kingdom	40	80	80	—	—
Netherlands	20	30	40	—	—
France	20	20	30	—	—
Canada	10	10	10	—	—
Others	20	30	30	—	—
TOTAL MARKET ..	220	390	480	640	1,630
Aviation Ground Support Equipment	220	390	480	640	1,630
Domestic Production					
Imports					
United States	10	50	100	150	480
Japan	50	200	250	—	—
West Germany	200	100	100	—	—
Netherlands	30	50	80	—	—
Australia	10	20	30	—	—
Singapore	10	10	50	—	—
Others	30	10	90	—	—
TOTAL MARKET ..	340	440	700	880	1,770
TOTAL MARKET SIZE...	62,940	77,010	84,100	81,930	203,210

Sources: Official Indonesian and Supplier statistics and estimates based on trade source interviews.

23% share in the same year. U.S. manufacturers' share of the aircraft market is expected to increase slightly by 1980 as a result of greater demand for

larger and more modern aircraft, while the Netherlands share is expected to decline somewhat during the same period. U.S. suppliers also lead in sales of aircraft engines and components with 46% of this market in 1975.

U.S. manufacturers were the main suppliers of airborne avionics equipment, with 79% of this in 1975; their share is projected to increase to 80% in 1980. Netherlands and U.K. suppliers follow.

MARKET OPPORTUNITIES

There are good opportunities for sales of air transport equipment. The Garuda and Merpati airlines are expected to purchase replacement aircraft. Garuda plans to purchase additional Douglas aircraft; Merpati will require larger short take-off and landing planes capable of operating from small, remote fields. Aircraft components with good sales potential include fuel and oil systems, wheel and brake systems, mechanical-optical instruments, flight safety control equipment, and radio navigation systems.

The planned upgrading of electric power generation capacity and airport lighting at 17 airports will result in the expenditure of \$7.7 million for equipment and \$300,000 for technical support and services, including training, inspection, and supervision. Power equipment slated for purchase includes 15 electric power generators up to 500 kVA in capacity as well as transformers, high and low tension power cables, instruments and controls, and other ancillary equipment. Purchases for airport lighting will include lights, instruments and other items to install and upgrade visual approach slope indicator systems (VASIS) at five airports, runway end identification lights (REIL), runway and identification lights (RAIL), high intensity runway lights, high intensity threshold lights, low intensity taxiway and apron floodlights, beacons, wind cones, control desks, and other equipment, controls, and instrumentation necessary for installation and operation.

Ground avionics equipment for radio control and communications will also be in demand. The aids to navigation used in Indonesia are LF/MF nondirectional beacons (NDB) and VHF omnidirectional range (VOR). Most aeronautical stations in Indonesia use radiotelephony for air-ground communications; a few stations use a radiotelegraphy call sign. Related equipment will also be required. Procurement and installation of equipment for the rehabilitation, improvement, and extension of the VHF and HF air-ground communication of the aeronautical mobile/fixed services is planned for the following airports at a total foreign exchange cost of \$3.7 million. Bali, Palembang, Ambon, Manado, Ujung Pan-

dang, Banjarmasin, Pontianak, Medan, Jakarta, Kupang, and Biak.

Procurement of maintenance equipment such as tractors, dump trucks, rotary cutters, etc., and spare parts is planned for 50 airports in order to improve maintenance of runways, taxiways, aprons, shoulders, and overruns.

Demand for ground support equipment will grow—specifically aircraft servicing equipment such as tow trucks, fuel trucks, and service vehicles, baggage handling equipment, and cargo loaders. Escalators and boarding ramps will also be required as tourist arrivals increase.

The Government has set a goal for the national airport system to meet the minimum International Civil Aviation Organization (ICAO) standards for firefighting and rescue equipment. Plans call for the acquisition of the following equipment to upgrade firefighting and rescue capabilities at 44 airports:

<i>Units</i>	<i>Description</i>	<i>Cost</i>
6	Airport crash truck, 9,000 ltr. . .	\$1,727,988
19	Airport crash truck, 4,000 ltr. . .	2,307,341
29	Airport crash truck, 2,000 ltr. . .	2,621,745
41	Airport rescue truck, Capacity 250 Kg. DP	1,880,997
6	Commando car	60,000
75,200 (ltrs)	Foam compound (AFFF/Flouroprotein foam)	457,216
23,000 (kg.)	Dry chemical powder (foam compatible)	80,770
	Engine spare parts/accessories, and fire fighting equipment components	1,363,983

IMPORT PROCUREMENT

Buyers Universe

Indonesian buyers of air transport equipment include four main groupings: air transport companies, the Directorate-General of Air Transport, other government departments, and private users.

The air transport companies purchase their equipment and materials directly; from manufacturers the two government-owned firms must obtain the approval of the Directorate-General of Air Transport for large purchases, such as aircraft.

The Directorate-General of Air Transport, in the Department of Communication is Indonesia's Civil Aviation Authority. As administrator of airports, it purchases their equipment based on recommendations made by the individual airport administrations. The Minister of Communications makes the final decision on large purchases. The address for the Directorate-General is:

Directorate-General for Air Communications (Jl. Hayam Wuruk 2, Jakarta).

Supplemental carriers and general aviation are growing, and other government departments and government corporations as well as private firms and individuals comprise a growing segment of the Indonesian economy capable of buying aircraft. A number of entrepreneurs with extensive land and business holdings will be purchasing executive aircraft. The Departments of Agriculture and Health as well as oil companies, plantations, and mining companies constitute a growing potential market for general aviation equipment.

Foreign Suppliers Universe

Purchases of large aircraft are usually made directly from the manufacturer. Some suppliers such as Boeing and Douglas have representatives based in Jakarta to maintain customer contacts and to undertake training and service operations.

Sales of small aircraft, aircraft components, and avionics equipment are made either directly by the supplier or through Indonesian and regional representatives. Only a few firms based in Jakarta are capable of representing suppliers of advanced aviation equipment, and regional representatives based in Singapore and Hong Kong handle most sales to Indonesian customers.

Indonesian airline operators generally expressed a preference for the U.S. Douglas and Netherlands Fokker aircraft. Largest sales of light aircraft are of three American makes—Beechcraft, Cessna, and Piper. Hughes (United States), Bell (United States), and Aerospatiale (France) are the most purchased makes of helicopters. Other makes of aircraft frequently used in Indonesia include De Haviland (Canada), Vickers (United Kingdom), Lockheed (United States), Grumman (United States), Hawker Siddeley (United Kingdom), and Aero Commander (United States).

Leading suppliers of ground and air avionics equipment are the U.S. based firms: Bendix, Collins, Litton, and Sperry. Bendix and Sperry are strong in supply of radar and other avionics equipment, as well as auto-pilots and gyroscopic equipment. Collins has a strong market position in supply of communication aids such as HF and VHF radio. Flight data system sales are not yet significant.

Goodyear and Goodrich, both U.S. firms, have strong market positions in sales of wheel and brake systems. Smith (United Kingdom) also is a major supplier of avionics equipment. Philips of the Netherlands is an important supplier of air traffic control equipment.

MARKETING FACTORS

Indonesia has a shortage of trained technicians to repair and install air transport equipment. Suppliers should be prepared to provide mechanics and engineers to assist Indonesian buyers on the installation and operation of their equipment. The Indonesian market is limited by the ability of user to obtain personnel to operate and maintain equipment.

Large purchases of aircraft, avionics, and other air transport equipment are dependent on the availability of financing. For example, Garuda's purchases of Douglas aircraft have been facilitated by U.S. Export-Import Bank financing.

COMPETITIVE POSITION OF U.S. SUPPLIERS

U.S. suppliers have been aggressive and active and hold leading positions in major segments of Indonesia's air transport equipment market. Leading American firms have made extensive feasibility studies in their sales efforts directed at specific clients. However, more comprehensive market analysis and promotional programs are needed to sell light aircraft to organizations, firms, and individuals in the general aviation market. Such programs should include demonstrations of aircraft capabilities in a variety of applications, such as executive, medical, firefighting, cargo, and tourist services. Successful sales proposals often include a complete package of hardware, training and services so that the customer is assured of adequate operations and maintenance capabilities.

Appendix 1.—Principal Shipping Lines

<i>Firm</i>	<i>Home Port</i>
<i>Oceangoing Lines</i>	
P.T. Djakarta Lloyd	Jakarta
P.T. Gesuri Lloyd	Jakarta
P.T. Samudera Indonesia	Jakarta
P.T. Trikora Lloyd	Jakarta
P.T. Admiral Lines	Jakarta
P.T. Karana Lines	Jakarta

<i>Firm</i>	<i>Home port</i>
<i>Inter-Island Shipping Lines</i>	
P.T. Abadi Inti Lines	Jambi
P.T. Astri Line	Medan
P.T. Bachtera Lines	Medan
P.T. Palayaran Bahari (7 vessels)	Jakarta
P.T. Bahari Bahtera	Jakarta
P.T. Berdikari	Ambon
P.T. Deli Madju	Medan
P.T. Eja	Surabaya
P.T. Gapsu	Menado
P.T. Gebari Medan Segara (G.M.A.) ..	Medan
P.T. Indonesian Oriental Lines (I.C.L.)	Medan
P.T. Jaya Wijaya Shipping	Jayapura
P.T. Kalimantan	Jakarta
P.T. Karimata	Pontianak
P.T. Mahakam	Samarinda
P.T. Meratus	Surabaya
P.T. Maskapi Pelayaran Nusantara (M.P.N.)	Jakarta
P.T. Maskapai Pelayaran Sumatera (M.P.S.)	Padang
P.T. Nagah Berlian	Jakarta
P.T. Naga Laut	Jakarta
P.T. Nusa Tenggara	Denpasar
P.T. Palka Utama	Jakarta
P.T. Panurjwan	Jakarta
P.T. Pedjaka	Banjarmasin
P.T. Pelni (61 vessels)	Jakarta
P.T. Pelpn	Jakarta
P.T. Pelumin	Jakarta
P.T. Pelayaran Maluku (Pemal)	Ambon
P.T. Pepana	Medan
P.T. Perindo	Menado
P.T. Perintis Lines	Medan
P.T. P.P.S.S.	U. Pandang
P.T. Pelayaran Rakyat Indonesia (P.R.I.)	U. Pandang
P.T. Putra Samudra	Palembang
P.T. Salam Sejahtera (P.S.S.)	Palembang
P.T. Samapta	Jakarta
P.T. Samudera Jaya Line	Jakarta
P.T. Sejati	Jakarta
P.T. Siantan Coy	T.G. Pinang
P.T. Sri Indrapura	Pakanbaru
P.T. Sriwijaya Raya Line (11 vessels) ..	Jakarta
P.T. Surya	Menado
P.T. Taat Suradi	Surabaya
P.T. Tanjung	Jakarta
P.D. Wasaka	Banjarmasin
P.T. Wasesa Line	Jakarta

U.S. Government Services Available to American Exporters

MARKETING ASSISTANCE AND INFORMATION SERVICES

Foreign Promotional Events

The Department of Commerce sponsors a variety of promotional events designed to assist American firms and their representatives in developing export markets. Organized and staged by the Office of International Marketing (OIM), the events described below are utilized by U.S. exporters to penetrate the Indonesian and other markets, increase sales, and find agents and distributors for their products.

Commercial Fairs.—Commerce-sponsored exhibitions of U.S. products of high sales potential, usually of a major single industry, staged in important international trade fairs.

Solo Exhibitions.—Export promotions planned, mounted, and managed by the U.S. Department of Commerce in markets that offer promising export sales opportunities but which do not afford regularly scheduled fairs for the display of U.S. products to be promoted.

Specialized U.S. Trade Missions.—U.S. Department of Commerce organizes and sponsors Trade Missions covering selected product themes based on available market research and Foreign Service recommendations; Commerce establishes the overseas itinerary, pays the Mission's operating expenses, and provides an Advance Officer and a Mission Director.

Technical Sales Seminars.—These events, aimed at high technology markets, combine practical panel discussions by U.S. technology experts with individual private appointments. Additionally, these teams of U.S. industrial representatives on multi-country itineraries receive U.S. Foreign Service briefings, tour local installations, and conduct sales interviews, according to each represented company's marketing objectives.

Catalog Exhibitions.—Special displays of company catalogs, usually of a single industry, to test

markets, develop sales leads, and locate agents and distributors.

In addition to the above promotional techniques, the Department of Commerce also utilizes the following types to assist U.S. firms in promoting export sales:

U.S. Trade Center Exhibits.—U.S. manufacturers of specific products with prime market prospects and identified end users are drawn together at U.S. trade promotion facilities abroad, backed up by intensive promotion campaigns to attract the right buying audience.

Between-show Promotions.—Single U.S. company product or service promotions in U.S. Trade Centers, sponsored, organized, and conducted by the companies themselves or their representatives abroad.

Joint Export Establishment Promotions (JEEPS).—Tailor-made promotions designed to help small groups of U.S. manufacturers of related products to inexpensively penetrate new markets on a shared-cost basis.

U.S. Trade Promotion Facilities Abroad

U.S. trade promotion facilities abroad provide U.S. manufacturers with a unique method of testing and selling in key foreign markets through commercial show rooms established in central marketing areas where the potential for American products is continuous.

There are U.S. trade promotion facilities in the following cities: In Europe—Cologne, London, Milan, Moscow, Paris, Stockholm, Vienna, and Warsaw; in Asia—Osaka, Seoul, Singapore, Taipei, Tehran, and Tokyo; in Sydney, Australia, Mexico City, and Sao Paulo.

Information on exhibitions at U.S. trade promotion facilities abroad may be obtained from the Country Marketing Managers or the Commerce district offices listed on the inside back cover of this Survey.

Country Consultants

Country Marketing Managers (CMM's) provide U.S. firms with marketing information by specific country, counseling on the preparation of effective marketing plans, aids in selecting best opportunity markets, and assistance in participating in Commerce trade promotion activities. The CMM also can assist in obtaining other foreign business information available within the U.S. Government.

Popular among American businessmen seeking up-to-date marketing information are these publications available through Country Marketing Managers:

- *Overseas Business Reports* cover marketing and "doing business" information, economic data, and trade statistics in specific countries. Approximately 70 reports are issued annually.
- *Commerce America*, Commerce's biweekly magazine, contain reports on economic trends, trade developments, and Commerce-sponsored trade events.
- *Global Market Surveys* condense the findings of field research conducted in 20-25 of the best country markets. *Global Market Surveys* have either been published or are scheduled to be published through 1977 on the following themes:
 - Metalworking and Finishing Equipment (1975)
 - Avionics and Aviation Support Equipment (1975)
 - Process Control Instrumentation (1975)
 - Food Processing and Packaging Equipment (1975)
 - Air and Water Purification and Pollution Control Equipment (1976)
 - Laboratory Instruments (1976)
 - Business Equipment and Systems (1976)
 - Electric Energy Systems (1977)
 - Communications Equipment and Systems (1977)
 - Building Materials and Construction Equipment (1977)
 - Computers and Peripheral Equipment (1977)
 - Medical Equipment (1977)
 - Printing and Graphic Arts Equipment (1977)
 - Equipment for the Electronics Industry (1978)
 - Electronic Components (1978)
- *Country Market Surveys* are separate printed releases of the individual country reports included in *Global Market Surveys*.

- *Country Sectoral Surveys* illuminate the factors creating sales opportunities in market sectors in selected countries. They discuss growth by industry sector and the demand for U.S. capital goods over the next 5 years. The first three sectoral reports, *Brazil: Survey of U.S. Export Opportunities*, and *Nigeria: Survey of U.S. Business Opportunities* and *Venezuela: A Survey of U.S. Business Opportunities* are now available, and a report on Iran is in preparation.

- *Survey Special Reports* are prepared on timely opportunities and developments. Typical of these are: *The Market for Selected U.S. Capital Goods in Ecuador and Peru* (1975), *The Australian Market for U.S. Consumer Goods* (1975); and *A Report on the International Markets for U.S. Consumer Goods* (1976).

In addition, Country Marketing Managers receive an enormous quantity of information, both published and unpublished, on their countries. This data comes from private and public sources, American and foreign. It includes periodic reports received from the commercial sections of U.S. Embassies on selected industries or product categories, "best prospects" for sales in the coming year, and new developments and opportunities of special interest to the U.S. business community.

The Country Marketing Manager provides guidance and direction in commercial activities to the U.S. Foreign Service—Department of State, Trade Center Staffs, Commercial Fairs staffs, and other trade promotion personnel. This includes the planning and implementation of trade promotional activities listed earlier ("Foreign Promotional Events") within the respective country or countries. The CMM is the focal point in Commerce for the development and implementation of the annual Country Commercial Program, jointly prepared by Commerce and the Foreign Service, Department of State. This operational planning document establishes objectives and priorities for U.S. Government trade promotion and support of U.S. business by country, and the actions to be undertaken to achieve them.

For further information and assistance on marketing in Indonesia, please call or write:

Country Marketing Manager—Southeast Asia
U.S. Department of Commerce
Washington, D.C. 20230
Telephone: (202) 377-2522

CMMs for other areas are listed on the inside back cover.

Export Information Services

The export information services described below can be obtained by contacting the U.S. Department of Commerce, Office of Export Development, Export Information Division, Room 1033, Washington, D.C. 20230, or the nearest of the Department's 43 district offices (listed following this section). Recently modernized data handling and retrieval techniques now make many services available in a fraction of the time previously necessary.

Trade Lists.—Names and addresses of foreign distributors, agents, purchasers, and other firms are made available to U.S. firms through a series of trade lists. *Target Market Trade Lists* are published by country on each *Global Market Survey* theme. *Business Firms Trade Lists* cover all commercial establishments in small developing countries. *State Trading Organizations Trade Lists* name and describe government-controlled foreign trade organizations in nonmarket economy countries.

World Traders Data Reports.—World Traders Data Reports (WTDRs) provide descriptive background information on specific foreign firms. Prepared by the U.S. Foreign Service, the WTDR's include such information as year of establishment, method of operation, lines handled, size of sales territory, name of chief executive, general reputation in trade and financial circles, names and addresses of credit sources, names of the firm's connections, and other commercial information. The complete name, street, and city address of the foreign firm must be given when requesting this service. Nominal fee.

Agent/Distributor Service.—The Commerce Department's Agent/Distributor Service helps U.S. firms find agents or distributors for their products in almost every country of the world. U.S. Foreign Service Officers overseas will identify up to three foreign firms that express interest in a specific U.S. proposal. The charge for this service is \$25.

Application forms (DIB-424P) may be obtained from any Commerce Department district office.

Export Mailing List Service.—The Export Mailing List Service (EMLS) provides lists of foreign firms considered prospective customers for U.S. firms. Firms are drawn from the automated Foreign Traders Index. Their names and addresses are available on gummed mailing labels or in standard print-out form. Printouts also include: Name and title of an officer, type of organization, year of establishment, relative size, number of employees and salespersons, and product and/or service codes (Standard Industrial Classification numbers).

A nominal "setup" charge also covers the first 300 entries retrieved. Beyond 300, a small additional

cost per name is charged. Delivery can be made in about 15 days.

Foreign Traders Index (FTI) Data Tape Service.—This service is offered as a convenience to firms that have a continuing need for a broad range of foreign commercial data, such as export management firms selling a wide range of products. This service provides, in magnetic tape form, information on all firms in one or more countries covered in the Foreign Traders Index. Users may thus retrieve various segments of FTI data by running tapes through their own computer facilities. There is a flat fee for this service on a per-country basis for up to 15 countries. A single, fixed charge is made for a package of 15 or more countries or for the entire file.

Overseas Business Opportunities

The overseas business opportunities services described below can be obtained by contacting the U.S. Department of Commerce, Office of Export Development, Overseas Business Opportunities Division, Room 2323, Washington, D.C., or the nearest of the Department's 43 district offices.

TOP.—The Trade Opportunities Program (TOP) receives trade leads daily from overseas U.S. Foreign Service posts around the world and disseminates them to U.S. suppliers. Trade opportunities are based on inquiries by overseas companies that wish to purchase American products or services, or who are interested in representing U.S. firms. Trade opportunities may come from foreign governments, or even from multinational organizations such as NATO or the UN.

To register for TOP, U.S. firms are requested to specify their product and country interests and the types of commercial information desired—direct sales, representation, and/or foreign government tenders. As leads are developed by the Foreign Service, they are cabled to Washington, where they are matched by computer against the criteria established by U.S. companies. These leads are then mailed to appropriate U.S. firms within a week of their origination overseas. Trade leads are charged against prepaid subscriptions.

Overseas Product Sales Group.—The Overseas Product Sales Group (OPS) provides personalized assistance to TOP subscribers, or to firms identified as having high export capability, in bidding against foreign competitors for specific export sales opportunities with a value of \$1 million or more. The OPS specialists collect, inventory, and disseminate early information on export sales opportunities from TOP and a variety of other sources.

Foreign Investment Services Staff.—The Foreign Investment Services Staff (FISS) is the focal point

for American and foreign business inquiries relating to U.S. investment and licensing abroad. American businessmen are assisted in locating potential overseas licensees and partners, are provided with investment data on specific regions and countries, and then guided toward sources of capital for these proposed projects. Foreign investment and licensing proposals for which U.S. participation and technology is sought are published regularly in *Commerce America* and are brought to the direct attention of American firms where appropriate. In carrying out its broad range of activities, FISS works closely with other U.S. Government assistance sources, multinational agencies, and private regional investment organizations.

Office of Export Administration

Information on U.S. export control regulations may be obtained from the U.S. Department of Commerce, Bureau of East-West Trade, Office of Export Administration, Washington, D.C. 20230. Telephone: (202) 967-4811.

EXPORT CREDIT INSURANCE

The Foreign Credit Insurance Association (FCIA) is an association of 53 stock and mutual insurance companies in partnership with the Export-Import Bank of the United States. It offers a comprehensive selection of credit insurance policies which protect policyholders against loss from failure to receive payment from foreign buyers.

The benefits of this coverage may be summed up as follows:

- It protects the exporter against the failure of the buyer to pay his dollar obligation for commercial or political reasons.
- It enables the exporter to offer foreign buyers competitive terms of payment.
- It supports the exporter's prudent penetration of higher risk foreign markets.
- It gives the exporter greater financial liquidity and flexibility in administering his foreign receivables portfolio.

Who May Be Insured

Virtually any corporation, partnership, or individual doing business in the United States is eligible for FCIA coverage. An exporter may apply for a policy for himself or may become insured under the blanket policy of a bank or other financial institution which holds an FCIA policy.

Eligible Products

Foreign sales of all types of industrial, agricultural, and commercial products produced in the

United States and of services rendered by U.S.-based personnel are eligible for FCIA insurance.

What Losses are Covered

Comprehensive FCIA policies protect insureds against nonpayment of receivables due to unforeseeable commercial and political occurrences. Commercial risk which are covered include insolvency of the buyer or protracted defaults which may well arise from economic deterioration in the buyer's market area, shifts in demands, unanticipated competition, tariffs, or technological changes. Also covered are defaults due to such buyer problems as increasing expenses, the loss of key personnel, and natural disasters.

Political risks coverage applies to defaults due to governmental action and to political disturbances such as war, revolution, and insurrection. Such events may result in confiscation of the buyer's assets, detention or diversion of shipments, or cancellation of necessary licenses by the United States or by the buyer's country. Also covered is the inability or refusal of the foreign central bank involved to convert the buyer's currency to dollars. Political coverage alone is available for exporters who desire to assume their own commercial risks.

The Policies

The policies offered by FCIA are many and varied. They can be tailored to suit the needs of the individual exporters, service groups, and financial institutions. Aside from a small applicant fee, all premiums are paid only for goods actually shipped.

The Master Policy combines a deductible provision, discretionary credit authority, and once-a-year reporting to provide qualified exporters with lower premiums, independent credit decisions, faster services to overseas buyers, and less paperwork. It is a blanket policy which requires the exporter to insure all or a reasonable spread of his exportation.

The Short-Term Policy is a blanket policy which covers sales on terms of up to 180 days. It provides coverage of 90% for commercial losses and 95% for political losses. A moderate discretionary credit limit is included for each buyer.

The Medium-Term Policy provides 90% coverage (political and commercial) for capital and quasicapital goods sold on terms of 181 days to 5 years. The policy is written on a case-by-case basis so an exporter need not insure all his medium-term transactions as he would under a blanket policy.

The Combination Policy provides short- and medium-term insurance to protect U.S. exporters in transactions with overseas dealers and distributors. It includes flexible coverage for short-term

sales and for both inventory and receivable financing.

The Comprehensive Services Policy insures the receivables generated by the performance of services for foreign customers by U.S.-based personnel, or by U.S. personnel temporarily assigned overseas. Industries benefiting from this coverage include management consultants, engineering and related construction consulting services, and transportation companies.

Special Coverage Endorsements are available in addition to the above policies. These include endorsements to cover specified preshipment risks and consignment selling.

An Aid to Financing

FCIA does not finance export sales. However, the exporter who insures his accounts receivable against commercial and political risks is usually able to obtain financing from commercial banks and other lending institutions at lower rates and on more liberal terms than would otherwise be possible.

Prequalification of Buyers

FCIA's rapidly expanding prequalifying (P.Q.) program is now providing credit information on overseas buyers through its computerization data system. All the exporter needs to do is telephone the nearest FCIA office to determine whether a particular buyer is prequalified for the amount of his purchase.

Information about FCIA

More information about FCIA's services, and applications for policies, may be obtained through insurance agents or brokers or through FCIA's network or full-service regional offices. General questions and specific inquiries may be directed toward the FCIA Ombudsman in the New York office. Call (212) 432-6216 for a direct connection.

FCIA Offices

One World Trade Center—9th Floor
New York, New York 10048
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FINANCING EXPORT SALES

The Export Import Bank of the United States (Eximbank) is an independent agency of the United States Government created to facilitate and help finance U. S. exports. It does this through loans to overseas buyers of U. S. equipment and services where the repayment term customary in international commerce exceeds 5 years, and through insurance and guarantees of loans extended by U.S. commercial banks and exporters to finance exports on short and medium term (up to 5 years). Other programs include loans to overseas banks which arrange financing of their customers' import requirements. All disbursements are made against evidence of shipment from the United States.¹

Equipment and services loans are those extended to non-U.S. buyers of U.S. goods. In a typical instance, a foreign firm seeking to establish a new manufacturing line will obtain financing from Eximbank for a portion of the cost of the U.S. equipment to be purchased. This portion is generally about 40 percent of the contract price. There is a minimum cash payment of 15 percent required, and the balance of the financing is obtained from other lenders, occasionally with Eximbank's comprehensive guaranty of repayment. Often Eximbank will require a guarantor on its loan. In authorizing these loans, Eximbank will fix a rate of interest to be paid throughout the life of the loan, the specific rate depending upon the maturity schedule—the longer the repayment term, the higher the interest rate. Current interest rates are in the range of from 8 to 9 percent per annum. The rate increases one-eighth of one percent for each additional year of maturity after 5 years from au-

¹ U.S. businessmen should be aware that not all Export-Import Bank Programs are active in Indonesia, and they are advised to consult with the Bank regarding the applicability of specific programs in the Indonesian market.

thorization. In addition to the interest rate, Eximbank charges a commitment fee on the undisbursed balance, currently one-half of one percent per annum.

When borrowers are unable to arrange for the balance of the necessary financing on their own strength, Eximbank may issue its repayment guaranty to a U.S. financial institution. The fee charged for this guaranty, as with interest rates on Eximbank loans, is in a range, reflecting both term and Eximbank's assessment of risk. The range currently in use is from one-half of one percent up to one and one-half percent per annum on outstanding balances. There is also a commitment fee for financing guarantees, currently one-eighth of one percent per annum on undisbursed balances.

The Cooperative Financing Facility is a program through which Eximbank extends loans to cooperating banks abroad, covering one-half of the financed portion (after the minimum 15 percent cash payment), for U.S. purchases with the participant providing the remaining financing. This program enables buyers abroad to deal with their own banks, where they are familiar with local laws, language, and customs. Eximbank, on its part, lends to the participating bank and is relieved of the credit risk of the individual buyer. This program is intended for smaller transactions where the maturity of the loan is 5 years or less.

As with most other export credit agencies in industrialized countries, Eximbank operates a supplier credit program. In addition to that of the Foreign Credit Insurance Association discussed above, Eximbank is prepared to extend to participating U.S. banks its comprehensive guaranty of repayment (against specified risks) for nonrecourse export financing extended to their U.S. customers.

Businessmen and bankers—both U.S. and overseas—are invited to make use of Eximbank's counseling services, which include information on money markets in the United States, credit information on overseas buyers, and details on each of the programs discussed here.

For further information communicate with Eximbank, 811 Vermont Avenue, N.W., Washington, D.C. 20571—Telex 89-461.

OVERSEAS INVESTMENT INSURANCE AND FINANCE

In keeping with the objectives set forth by Congress, the Overseas Private Investment Corporation (OPIC) is fostering economic progress and development through private enterprise in some 80 friendly lesser developed countries in Africa, Latin America,

Asia, and Eastern Europe. It does this by providing qualified U.S. investors—large and small—with political risks insurance and financial assistance to support their investments in these countries.

OPIC insurance and financing are extended to new projects or the expansion of existing projects which are financially sound. All projects OPIC supports must assist in the social and economic development of the host country, and must be consistent with the economic interests of the United States.

Insurance Services

OPIC's insurance program provides coverage, in the areas indicated above, against:

- Inconvertibility of local currency earnings
- Expropriation
- War, revolution, and insurrection

To the private investor interested in establishing operations in the developing nations, political risk insurance is often an essential element in the decision to make a commitment overseas because, although he has the capability to assess the practical business considerations involved, he may find it difficult to judge the country's long-range political climate. OPIC's typical insurance coverage is available for up to 20 years at a combined annual premium of 1.5% for all three coverages. Today, nearly two-thirds of U.S. (nonpetroleum) private investment in the less developed countries is insured by OPIC.

Finance Services

The major objective of the finance program is to assist U.S. lenders and business enterprises in searching out and financing worthwhile private sector projects in the developing world. The three principal means for accomplishing this are OPIC's investment guarantees, its direct loans, and its preinvestment assistance program.

The investment guaranty program protects U.S. firms against loss from commercial and political risks by providing for repayment of principal and interest on loans made to projects in which a U.S. company has a major financial and managerial commitment. The direct investment fund offers long-term direct dollars loans at commercial interest rates to viable projects involved in manufacturing, processing, services, and agribusiness. Guarantees are available for mining and other natural resource projects. The preinvestment survey program is designed to assist investors on a risk-sharing basis in finding viable projects in the developing nations.

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Appendix I

MARKETING INFORMATION ON INDONESIA¹

Development Plan

Second 5-year plan (*Rencana Pembangunan Lima Tahun II—Repelita II*) fiscal years 1974/75 through 1978/79, began April 1, 1974. Fiscal year runs April 1 through March 31. A total of \$12.6 billion initially projected by the Government for the Development Budget during plan period; however, this figure did not reflect significantly higher revenues which have become available since plan was developed. Budget allocations for the first 2-year period of Repelita II (April 1, 1974 through March 31, 1976) reached about 43% of the total original 5-year budgeted amount. Planned expenditures by the end of the third year on March 31, 1977 will bring total expenditures to 79% of the original 5-year budgeted amount. Additionally, the development budget does not include the substantial nonbudget funded investments of state corporations such as the national oil company, the national airline, and other industrial and agricultural enterprises. The Development Budget represented about 44% of the total projected investment of some \$27 billion for the plan period.

Repelita II emphasizes employment, equitable distribution, regional growth and education, through provision of sufficient and better food and clothing, provision of housing materials and other facilities to the general public, improvement and expansion of infrastructure, expansion and more equitable distribution of social welfare facilities, and creation of greater employment opportunities.

Repelita-I (1968/69–1973/74) focused on dealing with urgent needs for stabilization, rehabilitation and early stages of development through economic recovery, restoration of infrastructure, expansion of private sector, mobilization of public and private resources and strengthening balance of payments.

Exchange Rate System and Control

There are two types of foreign exchange, Devisa Kredit and Devisa Umum. Devisa Kredit (DK), or

credit exchange, is a special type of exchange used for imports and related services financed by foreign commodity assistance programs. Devisa Umum (DU), or general exchange, supplied mainly by Indonesia's export earnings, is used for all other trade and invisible transactions.

The value of the rupiah has been maintained at Rp. 415 per U.S. dollar since August 1971, when Indonesia devalued the rupiah by about 10%. This rate is used for all trade and invisible transactions with a few exceptions, and is the customs valuations rate.

Indonesia has virtually no foreign exchange controls. Payments for the proceeds from invisibles are not restricted or subject to control. Proceeds from invisibles need not be surrendered.

There are no limitations on the remittance to Indonesia of capital in the form of foreign exchange or in commodities. Both residents and nonresidents may hold foreign currency deposits with foreign exchange banks.

Import Procedures

There is a registry of some 2,600 authorized importers and an initial deposit is required for registration. Approved importers are assigned an Import Identification Number (API) which remains in effect indefinitely unless it is suspended or revoked for cause.

As a credit control measure, Indonesian Government regulations prohibit the employment of "time or usance" letters of credit. Sight letters of credit must be opened through a foreign exchange bank for all private sector imports of merchandise with a FOB value of over \$100, except imports through bonded warehouses, authorized donations to government institutions, and goods constituting part of a foreign investment. Letters of credit may be revocable, irrevocable, transferable, devisable, or confirmed, as required.

Letters of credit may be opened after the goods have been shipped by the supplier, and even opened after the arrival of the goods at the port of destination in Indonesia. This system gives importers the benefit of not having to block their funds during the

¹ Based in part on OBR 77-05, "Marketing in Indonesia," March 1977, prepared by M. Virginia Webbert.

shipping period. Letters of credit financed out of the State budget must be opened within 14 days of the purchase of the required foreign exchange or relinquished to the central bank unless authorization for an extension has been received from the Department of Finance. Goods shipped under letters of credit opened to Hong Kong, Malaysia, Singapore, or Japan must, in most cases, be accompanied by a Special Consular Invoice.

After the goods have arrived in Indonesia and the necessary documents have been received by the foreign exchange bank, the importer, in conjunction with the bank, will complete a customs declaration form (KPP) in 6 copies. When the KPP is issued, the foreign exchange bank is required to collect the withholding tax (MPO) due as prepayment of the importer's income or corporation taxes. At the time the goods clear customs, the importer pays any required import duties and sales taxes.

A deposit of 100% of the c.i.f. value of imports in rupiahs must be made with the Bank of Indonesia when a letter of credit is opened for government imports. For nongovernment imports, importers are required to submit a cash margin of at least 40% of the c.i.f. value of imports when they open a letter of credit through a foreign exchange bank, and to settle the balance within 75 days of the opening of the letter of credit. The foreign exchange banks are required to purchase the foreign exchange in the Bourse before the letter of credit is opened. Bank commissions for opening the letter of credit and purchasing the required exchange are officially fixed at no more than one-half of 1% (0.5%) of the draft amount.

Banks in general are not permitted to extend credit for import financing; however, the Government has permitted banks to extend limited financing for imports in certain specific cases. Credit may be extended under certain conditions for the use of DK foreign exchange. The proceeds of medium- and long-term investment credit may be used for importing capital equipment and other goods required for the implementation of the financed projects. In order to expedite removal of some categories of goods from customs warehouses, the customs service may permit the removal of goods with payment of duties deferred for up to 2 months, subject to a fee of 2% per month on the value of goods. While foreign exchange banks may not grant credit for the 40% deposit required for the opening of letters of credit by non-manufacturing importers, they may extend credit to finance the 60% balance, provided the imports fall into certain classifications of essential or semiessential goods including critical food supplies, capital goods, raw materials, and other specified items. Manufacturers and exporters may receive financing for the total amount of the letter of credit.

Merchant's Letters of Credit.—"The Merchant's Letter of Credit" (MLC) is essentially a supplier's credit authorized under Indonesian trade regulations which enables the Indonesian importer to avoid full financing of the goods until they arrive in Indonesia. It is not a banker's letter of credit and carries no commitments on the part of the bank through which it is opened, and the opening bank must so state on their covering letter. Because the opening of usance letters of credit is not permitted, the MLC system was developed in 1970 to assist importers who could obtain suppliers credit from abroad to comply with the requirements that all imports be carried out on a letter of credit basis. A minimum 25% deposit must be made with the bank administering the transaction when the MLC is opened, to assist the Central Bank in keeping trace of these credits and provide partial payment in cases of default. The opening bank is not permitted to extend credit for this deposit.

MLC's may be used for any import except textiles, cement, carbon paper, stencil sheet, ceramics, concrete reinforcing bars, and glucose. MLC's were initially designed to cover goods (i.e., raw materials) that previously would have been sent on consignment to Indonesian subsidiaries of international companies, or alternatively by Singapore or Hong Kong suppliers to Indonesian traders with whom they had close connections, sometimes of a family nature. However, exporters in many countries, including the United States, have been using MLC's as a means of competing in Indonesia, in cases where the financial standing and reliability of the Indonesian firm can be established to their satisfaction.

Under the MLC system, the shipper normally surrenders the export documents to the Indonesian bank's overseas correspondent. These documents are then forwarded to the collecting bank in Indonesia which hands them over to the importer or his agent against payment or acceptance of the draft as instructed by the shipper. Payment is made in accordance with the agreement between the supplier and the importer, either through the opening bank or by transfer on the importer's own account in Indonesia or abroad, either immediately or on a deferred basis. On issuing the customs clearance certificate the bank is required to collect a withholding tax. Should the Indonesian consignee refuse to accept the goods, he forfeits his deposit and the Indonesian bank will contact the exporter for disposal instructions.

As insurance can be effected outside Indonesia, it is important that quotations be given on a c.i.f. basis when MLC's are to be used. Although the foreign supplier may find it necessary to pass on to the importer the cost of having his capital tied up while goods are in transit, such terms are usually attractive

because of the high interest rates in effect in Indonesia. It also frees the importer's own working capital for investment in the local money market, essential to his cash flow management because of the high cost of money locally. Additionally, by using the MLC system importers have been able to avoid handling the complete transaction through Indonesian banking channels; this may be useful in minimizing tax liability, since the full value of the transaction may not always be reflected in the documents held by the bank.

The Government has announced its intention to change step by step from the MLC to a bank credit system. In May 1976, certain regulations were issued in this connection. Foreign exchange banks were prohibited from accepting any documents which are not covered by a letter of credit or MLC. Secondly, the foreign exchange banks may not issue a customs clearance certificate until the documents are received from their overseas correspondent, and all documents must be routed from bank to bank. These new regulations have made it more difficult to manipulate invoice values, as well as restricting the practice of waiting until goods arrive in Indonesia before opening the MLC.

The potential supplier to Indonesia will wish to obtain a thorough grasp of the MLC mechanism as a means of facilitating and financing trade with Indonesian importers. It will also go a long way towards assisting him in understanding the complexities of trading in Indonesia.

Imports with Devisa Kredit.—The Indonesian Government has extended importers various incentives to stimulate the use of foreign aid funds. Incentives are designed to compensate importers for disadvantages (mainly higher interest costs) experienced in using aid funds granted by distant suppliers: i.e., the time/distance factor. These incentives include a system for up to 3 months forward purchase of DK foreign exchange at a small premium, as well as a rupiah rebate to the importer following the settlement of the letter of credit, which in effect can represent a discount of as much as 10% of the cost of the foreign exchange. Since the United States is making no more program loans to Indonesia and past loans have all been utilized, no DK exchange is available for importing from the United States.

Banking and Credit.—Five state-owned banks and three privately owned domestic banks are authorized to handle foreign exchange transactions. There are branches of eleven foreign commercial banks in Indonesia, of which four are American (see Government, Business and Financial Institutions report in this survey). Foreign banks are not permitted to establish branches outside of Jakarta, although some have developed management arrangements with In-

donesian banks in the regions. There are, in addition, representative offices of some 30 foreign banks located in Jakarta, including a number of U.S. international banks. There is also a number of finance institutions formed by groups of foreign banks as joint ventures with one of the Indonesian state banks, which are engaged primarily in investment financing.

Interest rates are high; as of mid-1976 the bank rate was 2% per month for short term credit, although the state banks were authorized to provide preferential credits at annual rates of 12 to 21% to finance certain priority activities. Medium term credit is available to certain qualified domestic firms under special programs for periods of 3 to 5 years at 12 to 15% per annum. Access to these credit facilities is difficult for most domestic firms. State banks follow relatively cumbersome and inefficient procedures. Factors other than credit worthiness are frequently involved in obtaining credit, where political and business connections are essential, and the expected commissions to bank officials for the granting of loans increases the cost of money.

There is no broad well developed market for discounting bills and other commercial paper. Working capital is difficult and expensive to obtain for many firms. For those firms which have access to the existing informal money market, primarily ethnic Chinese owned firms, interest rates are several times the bank rate. Indonesian Chinese firms often have access to credit in Singapore and Hong Kong through established business or personal relationships. Firms which must rely on domestic credit are seriously disadvantaged, especially when importing from non-Asian sources.

U.S. suppliers can increase their competitiveness in this market by (1) supplying Indonesia from regional depots in locations such as Singapore, or bonded warehouses, (2) assisting Indonesian customers to draw on credit facilities through U.S. banks in Singapore, Hong Kong or elsewhere at rates lower than Indonesia, (3) providing direct credit facilities based on U.S. domestic interest rates, or (4) shipping through the merchant's letter of credit mechanism. For a more detailed discussion of banking and financing in Indonesia, see the "Government, Business and Financial Establishments" report in this survey.

Import Regulations

Indonesia's present import system is basically a free system in which market forces are permitted to determine import priorities. No import licenses are required. There are a few nontariff trade barriers, including a prior import deposit system and a ban on certain imports to protect domestic industry and to

encourage local assembly operations. The import of certain other items regarded as critical is reserved to state enterprises. In general, tariffs are high, particularly on goods not essential for economic development, and basic consumption as well as those competitive with locally produced items. The importing of cloves, rice, wheat and wheat flour, fertilizer, and refined sugar is restricted to specified approved importers. Indonesia currently has no antidumping legislation.

Import Tariff Structure.—The Indonesian tariff consists of 13 basic duty rates ranging from 0% to 100%. Although Indonesia simplified its tariff system when the Brussels Tariff Nomenclature (BTN) was adopted on January 31, 1973, the system is still complicated and continues to include surcharges, extra levies (called "excess profits" levies) and exemptions. Taking account of 14 different surcharges and reductions there are currently 27 different effective duty rates, ranging from 0% to 27%. The BTN consists of 2,020 items.

Imports are grouped into two lists, mainly for tariff classification purposes. List 1 consists of four groups:

Group A—Most essential items, with duties ranging from 0% to 10% (rice, cereal flour, cotton, certain iron and steel products, certain organic chemicals and pharmaceuticals, fertilizers, and certain agricultural and industrial machinery and equipment, and some raw materials);

Group B—essential items, with duties ranging from 20% to 40% (these include raw materials and spare parts for industry);

Group C—less essential items, with duties ranging from 50% to 70% (these include some locally produced goods which require import protection);

Group D—luxuries, some consumer goods, and some goods produced locally, with duties ranging up to 100%.

List 2 is a list of about 30 prohibited items. These include: completely assembled passenger cars and motor cycles; completely assembled commercial vehicles imported into Java and Sumatra; completely assembled and semiassembled radio and television sets; galvanized and ungalvanized iron sheets; specified types of textiles; certain sizes of passenger and truck tires; Indonesian language materials; used glass bottles of certain sizes; certain types of batteries; electric light bulbs and fluorescent lamps, and matches.

Import duties are almost without exception *ad valorem*. The duties are levied on the c.i.f. value of the commodity converted at the customs valuation rate (Rp. 415 per U.S. dollar). In addition to tariffs import surcharges ranging from 50% to 400% are levied on some goods; 100% is the most common

rate, with luxury items and goods competitive with domestic products subject to the highest rates. An "excess profits" tax is applied to items on which there are not duties or surcharge.

Indonesian regulations governing investment under the foreign Investment Law of 1967 and the Domestic Investment Law of 1968 authorize various exemptions from duties as investment incentives. Also, under certain conditions, the payment of import duties may be deferred for a period of several months for essential imports.

Internal taxes.—An import sales tax of 5%, 10%, or 20% is levied on a wide variety of goods. Sales taxes have been reduced, however, and fewer items are now taxed at the 20% rate. The rate structure of the import sales tax is closely aligned to the structure of sales tax rates on domestic goods. Items which are exempted from import duties are also exempted from sales taxes.

The sales tax is levied on the sum of: the c.i.f. rupiah cost of the import; all custom levies (including the basic duty, retribution tax, surcharge, or excess profit levy); and a 5% importer markup. The tax must be paid at the time the goods are cleared through customs.

In accordance with Indonesian regulations regarding prepayment of income and corporation taxes, the importer must also pay the government a certain percentage of the c.i.f. import value as a tax prepayment. This withholding tax is called M.P.O.

Information regarding Indonesia's duties applicable to specific products may be obtained free of charge from: Country Marketing Manager for South Asia, Office of International Marketing, U.S. Department of Commerce, Washington, D.C. 20230; or from any Department of Commerce District Office. Inquiries should contain a complete product description, including BTN, SITC, or U.S. Schedule B Export Commodity numbers, if known.

Shipping Documents.—Documents required on shipments to Indonesia include the commercial invoice, the bill of lading (waybill for air cargo), the marine insurance certificate when the insurance is purchased abroad, and certain sanitary or other special certificates in some instances. No consular documents are required for shipments from the United States. Certificates of origin are required only in the case of a few types of imports involving drugs and narcotics.

When an importer applies for a letter of credit his bank assigns an import reference number which identifies the bank and branch, the document itself, and the year. This control number should be shown on all related financial, shipping, and custom documents.

Commercial Invoice.—The original manufacturer's (suppliers') invoices in duplicate, must be sup-

plied. No special invoice form is prescribed for shipments to Indonesia; forms may be printed on the firm's letterhead and sent under separate cover to the consignee. For all freight shipments the following information should be shown on the commercial invoice: name and address of shipper; place and date of shipment; name and address of consignee; number and kind of packages; contents and weight of each package; marks; and the import reference number described above.

Bill of Lading.—There are no special requirements affecting the preparation of bills of lading, except that they must show separately the amount paid for freight.

Marking and Labeling Requirements.—Indonesian regulations do not require special markings on shipments. The marking requirements of the country of origin are acceptable. However, as noted above, the import reference number assigned by the importer's bank when applying for a letter of credit should be part of the outer container markings to facilitate identification. The country of origin may be inserted as well as other marks desired by the supplier to help ensure safe delivery at the foreign destination.

The possibility of long storage at dockside warehouses in the tropical climate, rough treatment by dock workers, and considerable pilferage at ports should be taken into consideration in packing for this market. Articles affected by excessive heat and humidity should be tropicalized and packed with oil-lined paper so as to prevent deterioration. Nothing should appear on the outer case that will advertise the contents. Cardboard cartons are usually not adequate and importers are often willing to pay a higher price for strapped wooden cases.

There are no special requirements regarding labeling of merchandise; labels in English are quite acceptable.

Samples and Advertising Matter.—Commercial samples and advertising matter of low or noncommercial value may be imported into Indonesia (by freight, parcel post, or as part of commercial travelers' baggage) free of duty and without import permits. Samples should be prepared in such a manner as to clearly preclude their being of regular commercial use. There is no weight stipulation to determine whether or not a sample is a commercial import.

For samples having commercial value which will be reexported, a bank guaranty is required at the shipper's end in an amount to the sum of all normal costs of importing plus the full applicable import duty. Payment will not be required if the goods are reexported within the time limit fixed by customs, usually 6 months. In some cases, the time limit for reexport can be extended to 2 or even 3 years.

Customs Clearance

Entry of goods into Indonesia is complicated by cumbersome clearance procedures and inadequate cargo handling and storage facilities. Another complication often noted by traders is the traditional expectation of payments to customs officials.

Customs clearance is slow, often taking 4 to 6 weeks or longer after goods are unloaded. Clearance requires signatures on some 30–40 papers, with one official checking weight, another price, etc., and extra payments are expected in order to keep papers moving. The importer, however, is often under considerable pressure to get his goods cleared because of high port storage fees, high interest rates for trade financing, and regulations subjecting goods to penalties or ultimate disposal if they are not cleared within specified time limits.

Customs classification procedures for tariff evaluation further complicate the clearance of imports. Although the adoption of the Brussels Tariff Nomenclature in 1973 somewhat simplified the tariff system, it still remains complex and customs officials retain wide discretionary authority in interpretation and application. At the same time, the widespread practice of underinvoicing and other forms of circumventing import regulations have resulted in government efforts to tighten procedures for inspection, verification, and assessment of cargo values. Negotiation is the rule rather than the exception in customs evaluations, resulting in opportunities for exercise of impropriety.

Many foreign firms which have successfully done business in Indonesia recommend that building a reputation for honesty and straightforward business practices is the best policy in dealing with customs officials. Invoices, packing and shipping documents, pricing information, etc., should be scrupulously prepared and in compliance with Indonesian requirements. Customs officials should be kept posted of price changes and adjustments. It is unlikely that importers can avoid payment of gratuities for services, but this should be distinguished from complicity in illegal manipulation. The U.S. businessman can protect himself from unreasonable demands by immediately establishing a reputation for following correct and accepted business practices. Succumbing to the temptation of underinvoicing, or clearance of goods before official payments are made may lead to continuing marketing problems.

Many firms have found that the use of a clearing agency to handle import documentation and customs clearance can save time and trouble, particularly if the agent has bonded warehousing facilities. The usual clearing agent fee is about 3% of c.i.f. value. It is essential, however, to select a reliable agent who

is willing to comply with the policies established by his principal in dealing with customs officials.

Bonded Warehousing.—P.T. Bonded Warehouses Indonesia (BWI), a State enterprise, provides bonded warehouse facilities at Nusantara Harbor within the boundary of Tanjung Priok (port of Jakarta) and at Jakarta Kota, in the capital city. The 20,000 square meters of covered storage space are almost fully utilized by foreign firms, including several U.S. companies. Charge for storage space is Rp. 1050 (US \$2.53) per cubic meter per 30-day month. Insurance coverage for goods in storage costs \$2 per \$1,000. In addition, BWI has 25,000 square meters of open storage space.

Goods can be shipped to BWI on consignment to be released upon instruction of the supplier. No letter of credit is required. No import duties need be paid. The goods remain the property of the supplier and can be shipped back to any destination outside Indonesia as long as they have not physically entered the Indonesian customs territory.

Importers using BWI need not make an advance deposit for purchase of foreign exchange to open a letter of credit until they wish to take delivery, thus avoiding the higher financing costs involved in direct delivery from distant suppliers.

In addition to providing bonded warehouse facilities, BWI is developing a duty-free industrial zone in a 30,000 square meter area adjacent to its warehouses at Nusantara Harbor. This is designed primarily for light manufacturing, export-oriented industries. As of mid-1976 only one factory was operating in the zone, but construction of seven others has been authorized.

Additional bonded warehousing facilities will become available in late 1976 at Cakung near Jakarta. The facilities are being constructed on a 175-acre site served by rail and highway, and will include large warehouses with a capacity of 280,000 tons of general cargo, 112,000 tons of logistical supplies, and 28,000 tons of flammable materials. There are 23,400 square meters of covered storage space 68,000 square meters of open storage space planned for the facilities.

Containerization is developing steadily in Indonesia. Both 20- and 40-foot containers are being handled in Jakarta, but because of labor pressures and road load limits containers are not yet being transported to users. Instead they are unloaded in the port area and the contents transported conventionally. However, the use of containers in conjunction with bonded warehousing does provide shipping, storage, and security advantages in many cases. Belawan Port (Medan, North Sumatra) also handles 20-foot containers.

Outside the Jakarta area, the Government of Indonesia plans to build bonded warehouses on Tarakan Island off the northeast coast of Kalimantan; on Batam Island, just south of Singapore; and in Cilacap on the south coast of Central Java. Bonded warehouse facilities are nearing completion at Surabaya, Java, where a duty-free industrial zone is also in the planning stage.

Shipping

U.S. flag carriers provide liner services to Indonesia from Gulf, East and West Coast ports. From Gulf ports, Central Gulf Lines, Inc., 2700 International Trade Mart, New Orleans, La. 70130, provides barge-carrying vessels (LASH); Lykes Bros. Steamship Co. Inc., Lykes Center, 300 Poydras St., New Orleans, La. 70130, provides breakbulk service; and the American President Lines, 1509 Cotton Exchange Bldg., Dallas, Tex. 75201, provides Mini-Landbridge Container service. From West Coast ports the following U.S. flag carrier service is available: (1) States Steamship Co., 320 California St., San Francisco, Calif. 94104, offers twice-monthly cargo vessel service (container, breakbulk, bulk liquid—deep tank—refrigerated space: H/L capability-to 65 L/T). Load ports are Puget Sound, Columbia River, Los Angeles and San Francisco; discharge ports are Jakarta and Surabaya; (2) American President Lines Ltd., 601 California St., San Francisco, Calif. 94108, provides 14-day frequency container-ship vessels; dry and refrigerated cargo, by relay from Portland (via overland service), Seattle, Los Angeles, and Oakland/San Francisco for discharge in Jakarta. It also provides approximately twice-monthly service from California/Columbia River-Puget Sound to discharge ports in Indonesia (per inducement); (3) the Pacific Far East Line, Inc., 1 Embarcadero Center, San Francisco, Calif. 94111, has twice-monthly service; LASH vessels, Minibulk and unitized general cargo barge service; refrigerated and dry containers; deep tanks. Load ports are Los Angeles and San Francisco; cargo is accepted for Jakarta, Belawan, Palembang, Surabaya, Bandjarmasin, Balikpapan, and Pandang with transshipment at Singapore.

From U.S. East Coast ports the Central Gulf Line, International Trade Mart, New Orleans, La. 70130, provides LASH barge service every 3 weeks from Norfolk (also Savannah, Charleston, Baltimore, and Philadelphia via Norfolk) to Batam Island and Port Kelang, Indonesian outports. Lift capacity is 500 tons.

Import Channels

Since 1968 the Indonesian Government has reserved importing and exporting for Indonesian com-

panies, as well as wholesale and retail distribution in the domestic market. The Government reaffirmed this policy in early June 1976, although it is widely believed that this action was directed more at domestic firms owned by ethnic Chinese rather than at foreign owned business firms, since the latter have been subject to the regulations since they were first issued in 1968. In November 1975, a new regulation was issued requiring that foreign nationals in certain export, import, distribution, and service activities be replaced by Indonesians within 12 to 36 months. While only Indonesian nationals may now obtain a general importer's license, some established foreign firms have been permitted to retain their licenses, and new foreign investors can still obtain an importer's license for their own projects. Both foreign and domestic firms primarily engaged in industrial production or exporting, as well as government agencies may also import for their own needs. Since December, 1970, the import of specified types of heavy equipment, including road rollers, hoisting and lifting apparatus, tractors, tow trucks and forklift trucks must be handled by a national franchiseholder or sole agent.

Foreign trade in Indonesia has conventionally been handled by general trading concerns which deal in a wide range of goods and commodities. Indonesian importers often do not specialize in particular product lines. There are, however, an increasing number of firms which concentrate on specific product groups, such as instrumentation, electronic and communications equipment, etc. There is also a large group of firms identifying themselves as suppliers of "Technical Goods" which concentrate on general industrial machinery and equipment. Such firms often have engineers on their staffs and are prepared to provide applications engineering assistance and after-sales technical support.

Trade Representative Offices.—Foreign companies may open and maintain a local representative office subject to permission of the Department of Trade. Completed application forms, together with a copy of incorporation papers and power of attorney, must be submitted. The annual fee to maintain the office is \$100. The representative may be an Indonesian national or company, or a foreign national, but only one representative office per firm is permitted. Foreign trade representatives are not permitted to engage in direct sales, but may engage in sales promotion, or provide market research and technical advice.

Many foreign firms and trading companies, including a number of U.S. firms, have opened trade representative offices in Indonesia. Some of these have expatriate representatives. Often the representative offices have established close connections with Indonesian national importers, and the two com-

panies operate nearly as one. The Indonesian company acts as agent/importer/distributor for the overseas principal; the foreign representative office promotes the products and, where necessary because of the technical or specialized nature of particular products, provides skilled technical assistance. The representative office is subject to Indonesian corporate taxes based on the volume of its sales and profits in Indonesia, and expatriate employees are also subject to personal income tax.

Appointment of an Agent.—A foreign firm can appoint an Indonesian company or person as its agent. The main difference between a Representative Office and an agent is that an agent is not limited in its function and can perform all trade activities, and is allowed to have several offices throughout Indonesia. When an agent is appointed, expatriate personnel stationed in Indonesia under representative office status can be assigned to the agent and become an employee of the agent for purpose of satisfying Indonesian law.

In many cases a separate agreement is signed between the expatriate personnel and their foreign employer related to this assignment, for the purpose of regulating the relationship of the expatriate and company outside Indonesia. The tax liability of the foreign firm is limited to the income tax of the expatriates assigned to the Representative Office, and any other taxes are assessed to and borne by the agent.

Since a commission agent or agent-distributor arrangement may not be satisfactory for the marketing of certain types of products in Indonesia, several forms of association with Indonesian companies have been developed to comply with government policy on trade and distribution which permit the foreign firm to establish a permanent presence in Indonesia.

Cooperation under Management Agreement.—This form is a step toward a more active role of the foreign company in Indonesia. The forms of Management Agreement can be classified as follows: (1) Technical Assistance Agreement, (2) Management Agreement, and (3) Management Agreement coupled with a Financial Agreement. In the Technical Assistant Agreement, the foreign party's function is limited to a pure technical assistance in the Indonesian company. In the Management Assistance Agreement, the foreign firm's role is to manage the company or a division thereof. In the Management Agreement coupled with a Financial Agreement, the foreign company also finances the operation of the Indonesian operation either under the name of the Indonesian company or division thereof. The remuneration, of the Foreign company can be in the following form: (1) fixed fee, (2) commission, (3) profit sharing. Whatever basis is used for the remuneration,

it must be formulated clearly in the agreement and applicable under the present Indonesian laws. To protect the foreign company's interest properly a bona fide and comprehensive agreement must be drawn between the parties concerned.

Using Nominees.—Another method used by some foreign firms to enlarge their scope of activities in Indonesia is establishing an Indonesian Company through nominees. The nominee holds the shares upon the foreign party's instructions, and for the day-to-day management of the company, a Management Agreement is formulated.

Great care is required in selecting the persons appointed as nominee, as a dispute in the relationship can result in lengthy and expensive litigation, since this structure is, in effect, a method of evading the present Indonesian trading laws, it is not generally recommended.

Distribution Practices.—The major islands of Indonesia constitute distinct marketing areas. Each of these marketing areas has distinct ethnic, and socio/cultural differences, with varying degrees of economic development. Java is by far the principal market and the most important distribution point for the country's imports. Together with adjacent Bali and Madura, Java has nearly two-thirds of the total population. About 70% of Indonesia's imports from foreign countries enter through Javanese ports, and the country's industries as well as population are concentrated there.

Jakarta, the capital of Indonesia, constitutes the greatest single market, since it is the largest city in Indonesia, with a population of some 5 million. In Jakarta are located the largest commercial establishments, houses, banks, import and export firms, shipping and transportation facilities, and the Government's administrative machinery for foreign trade. Foreign banks may have branches only in Jakarta and all major foreign investors also have offices there. Jakarta's Tanjung Priok harbor handles over one-half of the country's incoming cargoes; second largest city (about two million), while Surabaya's port of Tanjung Perak handles somewhat under 10% of imports. Besides Jakarta and Surabaya, other major urban centers are Bandung in West Java and Semarang in Central Java.

The Island of Sumatra, with nearly 20% of the total population, may be divided roughly into three marketing areas: the north, with Medan the principal urban center, (Belawan, Indonesia's third largest port, serves Medan); the southeast, with its main center at Palembang; and the west, with the main urban center of Padang. Imports through Sumatran ports comprised some 20% of the country's total.

Sulawesi, with a population of nearly 10 million, may be divided roughly into the north, with the prin-

cipal urban center of Manado and the south with its center Ujung Pandang. With the port of Makassar. Sulawesi's imports from foreign countries were less than 5% of Indonesia's total imports.

Kalimantan, although a vast land area, has a population of only about 6 million and accounts for about 7% of imports. However, it has increasing market potential based on recent foreign investment, particularly in forestry. Rising wage rates and revenues resulting from foreign investment operations will also contribute to the area's market potential. Principal urban areas are Banjarmasin (South), Pontianak (West) and Balikpapan (East).

West Irian, with a population of about one million, is the most primitive island of Indonesia, but may also have a modestly increasing market potential based on extensive foreign investment. The capital and principal city is Jayapura.

Since present distribution networks and communication facilities are limited, sales representatives are often appointed in several centers (i.e., Jakarta, for West Java; Surabaya, for East and Central Java; Medan, for North Sumatra; Palembang, for South Sumatra; and Ujung Pandang, for Sulawesi, etc.) rather than trying to serve the entire country in a single central city, such as Jakarta.

Government Procurement.—A large share of Indonesia's imports is procured by the Government and State-owned enterprises due to the dominant role of the Government in industrial activities and the extensive financing by foreign countries and international agencies for development projects in transportation, agriculture, and other sectors of the economy under government control. Through its agencies, the Government owns and operates the railroads, the highway network, seaport and airport facilities, the telecommunications system, and most of the electric power facilities.

The State petroleum corporation, Pertamina, which represents the Government in all foreign oil agreements, also produces oil, controls domestic oil distribution, and has a monopoly of refining facilities.

State-owned mining enterprises currently produce a large part of the country's tin, coal, bauxite, nickel, iron and other minerals, although foreign capital also plays an important role in mining.

State-owned companies operate large rubber, palm oil, tea, cinchona and other agricultural estates. Most teak is also produced by a Government owned corporation. Several state trading companies compete with private enterprises in import and export activities.

Other state-owned companies are in the insurance, publishing, metal-working, and construction industries, and still others operate a large array of manu-

facturing enterprises producing cement, fertilizer, textiles, paper, tires, cigarettes, and glass. In many cases, particularly in agriculture, mining, manufacturing and trading, the Government acquired operating enterprises by nationalization of Dutch firms during the 1950's; in other cases, such as public welfare activities, the Government has undertaken to support development in areas not of interest to private capital.

Before recent reorganizations, all state companies could be identified through the use of the prefix P.N. (Perusahaan Negara—state enterprise) before the company name. Unless special circumstances apply, P.N.'s are wholly owned by the Government and operate under a Government department; their employees are civil servants and their operations are included in the state budget. As late as 1969, there were about 140 companies organized as P.N.'s concentrated in the fields of agriculture (31), communications (26), industry (24), and public works and power (18). Many enterprises also have been run by provincial governments.

State enterprises are gradually being consolidated and reorganized into three basic categories (1) "departmental companies" engaged in activities of a public service nature whose capital will be determined annually through the state budget. These are designated Perusahaan Jawatan, or Perdjan, such as the State Railway Corporation (Perdjan Kereta Api-PJKA); (2) "public companies," established as entities separate from the Departments, and whose capital is separate from the State budget. These are of a public service nature also operating as businesses, and are designated Perusahaan Umum, or Perum—examples are Perum Telekomunikasi in the telecommunications and Perum Listrik Negara in electric power; and (3) "limited liability corporations" subject to the same rules and regulations as private corporations. They are designated as Perusahaan Perseroan, or Persero, but actually bear the same prefix as the private limited liability corporations or P.T.'s—Perseroan Terbatas. However, all or part of the shares of a public corporation must be owned by the Government (national or provincial) while the remaining shares may be sold to private parties. The Government has been encouraging, and, in some cases, requiring state enterprises to become P.T.'s. The policy intent is to make them into profitable enterprises so that their shares can eventually be sold to private (including foreign) investors, thus reducing Government involvement. Some loans from donor countries and international organizations have been conditional on the reorganization of the enterprise into one of the above forms. At the local level, provincial and municipal governments have sold many of the enterprises they formerly owned and operated to private entrepreneurs.

The government budget does not include expenditures by state enterprises that have been converted into limited liability companies, and they have full responsibility over funds at their disposal, accounting only annually to the Government as the shareholder. While the Government appoints key members of the boards of directors of these firms, the firms have almost complete operational independence, and their personnel are not state employees. Included in government budgets, however, are expenditures of the Perum type State enterprises and those in the "perjan" category.

Indonesia has no central government purchasing agency; each ministry, department, institution, or project is responsible for its own buying after its budget has been approved by the Finance Ministry. The Finance Ministry has introduced a system of project specification (DIP) and activity specification (DIK) for control purposes.

In an effort to adjust government buying to the general spending profile outlined by the Finance Ministry, the Ministry under the DIP/DIK system requires approval of proposed purchases with regard to the timing of expenditures and the amount involved. Additionally, in any purchase decision involving export credits, BAPPENAS, the National Planning Body, will be involved in deciding on the propriety of the financing and sourcing in relation to the Government's overall development, debt management, and spending plans. The buying units retain considerable freedom to choose among sources, specifications, and brands. The Government has, however, issued certain general purchasing directives, such as established price guidelines for the purchase of automobiles by state entities. There is no "Buy Indonesia" policy in effect, although government agencies are encouraged to do so. There is some discrimination shown in favor of local contractors at the provincial level.

Procurement Procedures.—Procurement by government agencies and enterprises may be financed by funds appropriated through the Central Government's or Regional Government's budgets, through funds derived from their own operations, or through funds made available by foreign governments or international agencies for specific projects and essential agricultural commodities. Procurement procedures are not standardized and vary with the department or agency involved. Also, each lending country (including the United States) or international agency has its own regulations for assuring the proper use of funds, which must be met in the procurement process.

Most imports are procured through a public tender issued in Jakarta, although a limited bid tender may be issued if the purchase is urgent or requires special

design or handling. For very urgent purchases, a previous supplier may be utilized.

Prequalification requirements may be set for the firms wishing to bid. Bids in response to tenders are evaluated on the basis of price and payment terms, quality, delivery time, port of delivery, and the firm's reliability, experience, and ability to meet technical specifications. For major items, additional considerations are after-sales service and having a representative in Indonesia. Purchases are made on the basis of a purchase contract. Unless credit is involved, payment usually requires about 2 months.

Procurement of agricultural commodities under the U.S. Public Law 480 Program is handled largely by government agencies. For example, the State Logistics Affairs Board (BULOG) handles rice and other foodstuffs, while the Department of Textiles handles cotton and cotton yarn. Procurement directives are given by these agencies to TOBEAS, an operational team for economic assistance from the United States headquartered in New York City, which issues invitations to bid. The team is located at the Indonesian Consulate General, 5 East 68th Street, New York, N.Y. 10021. While nearly all procurement by TOBEAS is under the P.L. 480 Program, this organization may also handle other procurement under special instructions from Jakarta.

A well connected and knowledgeable local representative is essential to handling business with government buyers. Contacts and personal relationships with key decisionmakers are vital in this market.

The practice of paying, buyers commissions and rebates is widely practiced, particularly in government purchasing, and purchasers prefer to handle these arrangements through local intermediaries. Often government buyers will accept a marketing presentation from a foreign sales representative, but will request that he send his agent to handle the actual sales negotiations. This may also be advantageous to the foreign supplier, who can pass on the added costs of obtaining the business through his agent in the form of markups, commissions, etc.

Procurement under Foreign Assistance Programs.—Foreign aid creates trade opportunities in Indonesia for U.S. suppliers not only through U.S. loans, but through projects financed by multilateral lending institutions such as the World Bank Group and the Asian Development Bank, as well as loans from other donors for which procurement is not tied to the donor country. Development projects provide opportunities for supply of equipment and professional services through competitive bidding, as well as through subcontracting to prime contractors. Total Indonesian lending by the World Bank Group as of the end of May 1976, was \$1.46 billion of which International Bank for Reconstruction and

Development (IBRD) loans accounted for \$842 million, International Development Association (IDA) credits were \$561.8 million, and International Finance Corporation (IFC) investments in the private sector totalled \$58.4 million. Asian Development Bank (ADB) loans through mid-1976 totaled \$267.2 million, with an additional \$5.96 million in technical assistance projects. The multilateral donors pledged a total of \$670 million during 1976-77. Of the Washington-based World Bank Group, IBRD makes loans on conventional terms to finance infrastructure projects and other development activities, while IDA loans are made on softer terms; IFC investments are earmarked for the private sector, where they provide debt and equity financing to new or expanding concerns. From its Manila headquarters ADB provides loans at rates similar to the IBRD from its "Ordinary Capital" resources, while ADB Special Funds loans are made at concessional rates comparable to IDA.

Procurement systems for projects financed in Indonesia by the international lending agencies are generally similar and follow "international competitive bidding" procedures. Potential U.S. suppliers of equipment and services will wish to monitor the conventional outlets for information on projects. The U.S. Executive Directors on the boards of each institution are full time representatives of U.S. interests. Information on the status of projects under development in Indonesia is included in the monthly operational summaries and other announcements put out by the information offices of the World Bank Group and ADB. Project information can be obtained from the Department of Commerce in Washington, as well as through the U.S. Department of Commerce Field Offices, while notification of tenders and bid announcements can be obtained through the Department's Overseas Trade Opportunities Program. In Indonesia, tender announcements are published in leading news media.

Successful project bidding requires involvement at the earliest possible stage. This can best be accomplished through developing and maintaining close contact with Indonesian agencies concerned with project planning and implementation, including the various state enterprises, government departments and services which actually develop projects. These organizations frequently retain consultants who are influential in project development. BAPPENAS (The National Development Planning Agency) and the Department of Finance play a key role in the approval of any project in relation to planning and spending priorities. BAPPENAS prepares annually a document entitled "List of Project Proposals," which is a catalog of descriptions of those projects to which the Government of Indonesia has assigned high priority, and which require bilateral or multilateral

foreign aid assistance. Informally called "The Blue Book," this list is generally presented at the periodic meetings of the I.G.G.I. where individual countries and the multilateral lending institutions indicate interest in sponsorship of specific projects. The blue book is a key starting point for any firm interested in public sector project identification and development. Many of the project proposals are identified in the various reports included in this survey.

A bidder who has been in close touch with the project as the concept has evolved may be in a position to make some inputs into the project design. He can often discover requirements which are not adequately or explicitly stated in bid tenders and thus tailor his bid accordingly. While price considerations are afforded heavy weight in the bid evaluation, marketing to the Indonesian agency concerned and its consultants of such qualitative factors as technological advantages of design, durability, contracting experience, spare parts and service availability can offset the relative emphasis on price to some degree. The firm which has followed the project proposal during its formative stages will also be in a position to ascertain if prequalification of bidders is to be employed and if so, what requirements are being set. In many cases, suppliers of equipment and professional services may find it advantageous to associate themselves with Indonesian firms because of the contacts they have with key Indonesian decisionmakers, as well as because the multilateral lending institutions often give certain preferences to local bidders.

Key contacts for the international lending agencies include:

World Bank Group
1818 11th St., N.W.
Washington, D.C. 20433

World Bank Resident Staff in Indonesia
Jl. K.H. Wahid Hasyim, 100
Jakarta, Indonesia

Asian Development Bank
2330 Roxas Blvd. (P.O. Box 789)
Greater Manila, Philippines

Export Information Reference Room
Room 1063
U.S. Department of Commerce
Washington, D.C. 20230

U.S. Programs.—As a result of congressional action, the thrust of U.S. Agency for International Development (USAID) programs was shifted in 1974 from capital development and infrastructure projects to programs having broad social impact. Agricultural commodities continue to be provided under P.L. 480. Loans and grants to Indonesia since 1974 have focused on rural development, transmigration, re-

search and development, agricultural education, health care and medical services, family planning, irrigation, sanitation and water supply. In FY 1976 a total of \$11 million in grants and \$40 million in loans were made. In future years the USAID program will expand technical and scientific collaboration in science and technology, education and manpower development, health, agriculture and rural development. USAID-sponsored activities provide opportunities for supplying of professional services and some equipment. Most USAID program procurement is through competitive bidding in the United States. However, as in the case of the international lending agencies, on the spot contact with USAID and Indonesian officials can provide the prospective bidder with a competitive edge. Because the new USAID program includes provisions for a wide range of subprojects under each loan program, firms may be in a position to develop specific subprojects proposals with the appropriate Indonesian agencies. Key contacts for USAID include:

Program Office
USAID

American Embassy
Jakarta, Indonesia

Agency for International Development
Department of State
Washington, D.C. 20523

Lending in Indonesia by the U.S. Export-Import Bank (U.S. Eximbank) has been primarily to the Indonesian Government and its agencies for projects and equipment, although there have been some private sector loans considered for foreign investors and Indonesian firms able to obtain offshore guarantees. Total Eximbank exposure in Indonesia as of October 31, 1976 was \$594.2 million (including loans authorized but not yet disbursed). For further information on Eximbank programs see the special section included in this publication.

Advertising and Research

In Indonesia, personalized sales calls on prospective end users, reinforced by concerned and sympathetic technical support, are the most effective route to sales success. Direct mailing of product literature and use of the various advertising media are import adjuncts to this direct sales effort.

Newspaper advertising is recommended for introducing a product, since numerous newspapers reach a significant portion of the business community. Daily Jakarta newspapers with an estimated circulation of 75,000 or more include *Kompas*, *Sinar Harapan* (both of these have large advertising sections) and *Merdeka*. Another is *Berita Buana*. English

language papers include *The Jakarta Times* and *The Indonesian Observer*.

There are a number of domestic and regional magazines and other periodicals which also have fairly large circulations and are read by management groups. These magazines include the following:

General

Tempo, Jl. Senen Raya, 83, Jakarta ("Time-like" weekly national newsmagazine)

Business

KADIN, published by Indonesian Chamber of Commerce and Industry, Jl. Iskandarsyah Raya, 1, Kebayoran Baru, Jakarta (monthly magazine) "Warta Ekonomi Maritim Review," Published by Maratime Press Foundation, Jl. Raya Pelabuhan 7, Tanjung Priok, Jakarta (monthly shipping and general industry oriented magazine) "Progress," Jl. Gajah Mada, 162B, Jakarta (weekly business newspaper)

Regional

Asian Business and Industry, 1908 Princes Bldg., Hong Kong (monthly magazine)

Modern Asia, P.O. Box 770, Hong Kong (magazine published ten times yearly)

There is also an increasing number of specialized trade publications published for readership in specific business sectors. Many of these publications are identified in the industrial reports of this survey.

The Government-owned television and radio networks are additional advertising media which may be effective marketing aids. Television Republic Indonesia (T.V.R.I.) at Jalan Senayan, Kebayoran Baru, Jakarta, the only television network, reaches potential customers through a growing number of television sets throughout the country. The Government's radio network, Radio Republic Indonesia (R.R.I.) at Medan Merdeka Barat 4, Jakarta, and many small private radio stations throughout Indonesia also handle advertising. The latter should be arranged through a local advertising agent. This agent can also arrange for signs or posters on the exteriors of buses, bus stop shelters and bridges which are fairly effective advertising media for some products. Advertising in movie films and cinema slides is also widely practiced in Indonesian theaters.

To compete more effectively in the Indonesian market U.S. firms should use advertising media more extensively and provide technical, promotional, and financial assistance to their Indonesian representatives. There is a number of reliable advertising firms in Jakarta.

Most U.S. companies lag behind their competitors in both the volume and inventiveness of advertising techniques. One distribution of both U.S. and Japanese construction-related equipment, for instance,

has indicated that a Japanese firm provided specially prepared video tapes in the Indonesian language for use on local television, while the advertising fee allowed by a U.S. firm they also represent was too small to finance any real marketing effort. Advertising costs are often built into the pricing structure for Japanese products and special assistance is given by the Japanese principal to tailor the advertising to the market characteristics and the available media.

Market Research and Trade Organizations.—

While a growing number of Indonesian organizations engage in market research, it is sometimes difficult to find the level of competence required by U.S. firms. Branches of American banks in Jakarta will often make market surveys for their customers, and there are a number of Indonesian firms affiliated with leading U.S. consulting companies. Indonesian consulting firms in Jakarta have formed the Association of Indonesian Consultants whose members perform a wide range of research and consulting services. Advice on these firms and others may be obtained from the Economic-Commercial Section, American Embassy, Jakarta.

Market research in Indonesia is difficult because detailed statistics on production, imports, and consumption are usually not available in published sources. For a fee, import data by commodities may be obtained from the Central Statistical Bureau (Biro Pusat Statistik) at Jl. R. Sutomo 8, Jakarta. Fluctuations in the value of the rupiah over the past decade, and considerable unrecorded trade may distort import values and trends.

The major trade association in Indonesia is the Indonesian Chamber of Commerce and Industry (KADIN), whose membership includes representatives from private industry as well as cooperatives, utilities, public corporations, and State-owned enterprises throughout Indonesia.

Aside from associations of a general nature there are numerous groups with common interests in trade, industry, transportation, and other activities, which have organized specialized or professional associations. Key associations in each industry are identified in the industrial reports of this survey. Associations of importers and exporters, most of which are formed on a commodity basis, are organized within the All-Indonesia Importers Association (GINSI), and the Indonesian Association of Exporters (GPEI), all of which have head offices in Jakarta. The Jakarta addresses of the above organizations are shown below:

Indonesian Chamber of Commerce and Industry (KADIN) Jalan Merdeka Timur 11

All-Indonesia Importers Association (GINSI)
Jalan Mojopahit 1

Indonesian Association of Exporters (GPEI)
(Gabungan Pengusaha Export Indonesia)
Jalan Mojopahit 7

The American Chamber of Commerce in Indonesia, commonly known as AMCHAM, is affiliated with the Asian-Pacific Council of American Chambers of Commerce, and its membership represents the leading U.S. firms present in Indonesia. The Chamber works closely with the U.S. Embassy to further U.S. business relationships with Indonesia, and is prepared to assist American firms in assessing Indonesian business prospects and establishing themselves in Indonesia. The AMCHAM jointly with the embassy publishes the *Jakarta Business Bulletin*, which includes commercial and business news, as well as marketing promotion material; the Chamber has also prepared a number of useful guides on various facets of doing business and living in Indonesia. The Chamber has corporate and individual memberships. The organization's address is: AMCHAM, Jl. Kebon Sirih 35A, Box 2086, Jakarta.

The American-Indonesian Chamber of Commerce Inc., (AICOC), 120 Wall Street, New York, N.Y. 10005, telephone: (212) 344-1808, is the only organization in the United States representing U.S. firms having interest in or with Indonesia in the areas of trade and investment. The AICOC publishes detailed information bulletins and is a key source of information and assistance for firms in the United States which are interested in Indonesian commercial affairs.

The Jakarta Fair.—The Jakarta Fair is held annually in June–July. Although it includes educational and entertainment features as well as industrial and trade exhibits, many domestic and foreign firms find the broad public exposure provides a useful medium for marketing promotion. The Jakarta Fair Directorate plans to develop the fair into a premier commercial exhibition. An important feature in 1976 was the institution of special commercial visitor's hours daily, when the facilities were open only for the conduct of business. Another important achievement in 1976 was the opening of the major portion of the 10,000 square meter Hall of Nations. This covered exhibition hall with an adjacent 2,000 square meter open air exhibit space for heavy equipment will be an all-year site for commercial exhibits. It is equipped with air-conditioning, lighting, adequate electric power, water and communications facilities, and has concrete floors capable of supporting 15 tons per square meter. The exhibit facilities can be rented in total or in sections. Information on the Jakarta Fair can be obtained from the Jakarta Fair Management, Lapangan Merdeka Monas, Jakarta. Cable address: Jakarta Fair.

Visiting Indonesia.—Indonesia is accessible by air from most business centers in the Far East. The

majority of international flights land at Jakarta's Halim Perdanakusuma International Airport, although there are a few flights connecting Sumatran cities with Malaysia and Singapore, as well as some flights connecting Indonesia and Australia via Bali. Flights connecting Jakarta and Singapore (an hour trip) leave in both directions almost hourly. Pan American Airways has transpacific flights via Hawaii and Australia connecting the West Coast with Jakarta. There are extensive regular domestic air services connecting Jakarta and the major provincial business centers.

Making business calls in Indonesia is more difficult and time consuming than in the developed countries because of telephone problems, heavy traffic during business hours, and the difficulty of making appointments more than a day in advance. Since it is hard to keep more than three or four appointments during a working day, a minimum of several days should be allotted even for an initial survey of the market. This is especially true if the businessman wishes to meet with government officials or travel outside of Jakarta.

Business hours vary slightly from office to office, but most private and government offices are open 6 days per week. Most offices open at 7:30 or 8 a.m., with private offices closing an hour for lunch and then reopening until 3:30 or 4 p.m., while government offices remain open straight through until 2:30 to 3 p.m. when they close for the day. Government offices are open on Fridays only until 11 a.m., at which time they close in accordance with the Moslem religious custom in order that employees can attend communal prayers at the mosque. Saturday office hours are normally 7:30 to 8 a.m. through noon. Local businessmen are usually prepared to discuss business at a hotel before or after normal working hours. Business entertainment is customary and widespread.

Because of the tropical climate (Jakarta temperatures average 82° F or 28° C) business suits are not usually worn, except for visits to senior government officials or heads of diplomatic missions. Slacks, short-sleeved shirts and tie are always acceptable in most business situations, although "safari suits" are increasingly popular among both Indonesian and foreign businessmen.

Business cards are widely used, and will invariably be exchanged at the first meeting with any business or government contact; and ample supply should be brought.

Holidays.—A number of religious and secular holidays are customarily observed in Indonesia. Some holidays are on a fixed date while others vary with the lunar calendar. In 1977 Indonesian businesses and government offices are closed on the following

holidays: January 1, New Year's Day; March 2, Mohammad's Birthday; April 18, Good Friday; May 19, Ascension of Christ; July 14, Ascension of Mohammad; August 17, Indonesia's Independence Day; September 15-16, Idul Fitri (2 days); November 21, Idul Adha (Commemoration of Abraham's sacrifice); December 12, 1st Muharram (Moslem New Year); December 25, Christmas. The American Embassy and Consulates will be open on Good Friday and Ascension Day, but will be closed on the other holidays as well as on U.S. national holidays. In addition to the holidays listed, business visitors should be aware of the Islamic month of fasting, Ramadan. During the lunar month (28 days) of Ramadan Indonesian Government offices and many business establishments work a shorter business day, generally 8:00 a.m. to 12:00 noon. Ramadan is concluded by the holiday of Idul Fitri. The American Embassy can provide information on the dates of the moveable holidays each year.

Visas.—A visa is required for a visit to Indonesia of any duration. Visas may be obtained from the Visa Section of the Embassy of Indonesia, 2020 Massachusetts Ave., N.W., Washington, D.C. 20036; the Consulate General at 5 East 68th Street, New York, N.Y. 10021; and the Consulate at the World Trade Center in the Ferry Building, San Francisco, Calif. 94111.

Two types of visas are issued in the United States: the visitor's visa for 30 days or less which costs \$4.80, and the 30-day to 5 weeks visa which costs \$19.80; the latter includes a landing fee of \$15.00. A letter in duplicate from the firm which the businessman represents, stating the purpose of visit and guaranteeing sufficient funds, is required. Visa forms in two copies must be filled out and two photographs provided. The Indonesian Embassy and Consulates will mail the required forms upon request. The Department of Immigration may grant an extension of the visitor's visa.

A tourist visa is issued for a maximum of 30 days and a cost of \$2.80. Two forms and two passport photographs are required. The tourist must also provide proof of his intention and financial ability to depart from Indonesia, either through a round trip airlines ticket or a letter from a travel agency guaranteeing that the tourist has sufficient funds for the trip to Indonesia and return.

Multiple transit visas may be obtained which permit frequent trips into and out of Indonesia. However, these may be issued only by the authorities in Jakarta and require a substantial time to process. A request may be made to the Directorate-General of Immigration, at Jl. Teuka Umar 1, Jakarta, Indonesia.

Even though a person holds an Indonesian visa, permission to land or enter Indonesia remains at the sole discretion of the Immigration Officer in Indonesia. Also, the visa will not be valid if entry into Indonesia does not take place within the period specified on the visa.

Work Permits.—Foreigners may be employed in Indonesia only in occupations which cannot be filled by Indonesian nationals. Work permits may be obtained from the Ministry of Manpower, Transmigration and Cooperatives. Information required on the application form includes: a description of the occupation to be filled; salary and other benefits; period of employment; and programs under way or planned by the employer to train Indonesians for the job. Arrangements can be made for a reduction in the work permit fee for employers applying concurrently for a number of permits for employees needed for a given project. In addition to the work permit, the foreign employee is also required to have a visa.

Health.—Indonesian authorities require persons entering Indonesia to have a smallpox vaccination. While not required, the Indonesian Government recommends vaccination also for cholera and typhoid. Some visitors have a gamma globulin injection to prevent hepatitis and take malarial suppressives for certain parts of Indonesia. Since local water and food can upset the visitors, medication for stomach and intestinal ailments should be included in a traveling kit. Competent doctors and dentists are available in Jakarta for emergency consultation.

Currency.—The Indonesian currency is the rupiah and the mid-1976 exchange rate of Rp. 415 per U.S. dollar is used for all trade and invisible transactions. Indonesia devalued the rupiah when the government adopted the Rp. 415 rate in August 1971, and has maintained this rate subsequently. There are no restrictions on the conversion of dollars into rupiah when entering the country or on reconversion upon departure.

The Indonesian rupiah should not be purchased outside the country; Indonesian officials consider this practice an affront to their free exchange system, and the exchange rate for the rupiah abroad varies little from its official value. A money changer is available at the Jakarta international airport.

Currency may also be exchanged at any of the foreign exchange banks, including the branches of U.S. and other foreign banks in Jakarta and at many hotels. Rupiah cannot legally be taken out of Indonesia on departure.

Travellers' checks can be cashed at most hotels and banks, including all the branches of U.S. banks in Jakarta. Most of the banks are open between 8 a.m. and 3:30 p.m., Monday through Friday, and 8 a.m. to 12:30 p.m. on Saturday. As of mid-1976 an

increasing number of Indonesian business establishments were accepting the major international credit cards.

Other Information for Businessmen.—Baggage at Halim Airport is picked up from a conveyor system after the passenger completes health and immunization formalities. Uniformed porters are available, and as of mid-1976, the acceptable tip was Rp. 100 per piece of baggage. Customs inspections may be thorough, but legitimate business visitors are generally passed with little difficulty by customs officials. Newly arrived visitors should proceed to the front of the terminal and flag a marked, metered taxi; most drivers will readily use the meter, and the visitor should insist on this. The fare from Halim to the central hotel district should be no more than Rp. 1,500. The visitor may be approached by drivers of unregistered, unmetered taxis with offers of transportation. If such a taxi is used, the price is negotiable, and should in no case exceed the cost of a metered cab. Most taxi drivers understand minimal English.

There are a number of international standard hotels in Jakarta, and while prices are high, good accommodations are readily available. Leading hotels include the Hotel Indonesia, the Borobudur International, the Hotel President, the Sahid Jaya, the Kartika Plaza, Aryaduta Hyatt, and Jakarta Hilton. Rates in 1976 ran from \$18–30 per day for a single plus 11% tax and 10% service charge. Business discounts of 10–20% are often given. There are a number of smaller hotels and guests houses which offer comfortable accommodations at more moderate prices.

Metered taxis are probably the most efficient form of transportation for the business visitor; they are available at hotels and can often be flagged on the streets. Taxis can be hired on an hourly or daily basis. The adventurous visitor may find motorized pedicabs convenient for short trips. Prices are negotiable, but should not exceed Rp. 200 to Rp. 250 for rides of a mile.

Communications.—International airmail service to and from Jakarta is relatively reliable, although mail to addresses outside Jakarta will take considerably longer. Reliable International cable service is available, and telex is widely used by leading businesses in Indonesia for both international and domestic communication. International telephone service is available via satellite, and reception is excellent.

Government Representation.—Indonesia is represented in the United States by its Embassy at 2020 Massachusetts Avenue, N.W., Washington, D.C. 20036; by a Consulate General at 5 East 68th Street, New York, N.Y. 10021, where the Commercial Attache is located; and by a consulate at the World

Trade Center in the Ferry Building, San Francisco, Calif. 94111.

The United States maintains an Embassy in Jakarta at Jalan Medan Merdeka Selatan No. 5 (tel. 40001. It also has consulates in Surabaya (Jalan Raya Dr. Sutomo No. 33—tel. Selatan 836 and Darmo 7545 and 8037)) and in Medan (Jalan Imam Bondjol No. 13—tel. 22290, 22280, and 22200). U.S. Foreign Service Officers in the Economic/Commercial Sections are available to assist American businessmen visiting Indonesia.

It is advisable for businessmen visiting Indonesia to register with the American Embassy to facilitate contact in case of an emergency or to facilitate replacement of a lost or stolen passport. When traveling in the provinces, it is wise to carry passport, immunization records, and the Indonesian Immigration Document (if the stay is long enough to require the latter).

Industrial Property Protection and Commercial Arbitration

Indonesia is a member of the International Convention for the Protection of Industrial Property (Paris Union), and has a trademark law. However, there are no utility model or design laws. Under the reciprocal provisions of the trademark law, U.S. nationals are entitled to the same protection as Indonesians extends to its own citizens.

Patents.—There is no Indonesian patent legislation; the Indonesian Department of Justice handles patents on the basis of a Decree of August 28, 1963, under which an inventor or his assignee may file an application for the record pending adoption of a patent law. A patent application filed under this Decree establishes a "right of property" claim under the Paris Union Convention over applications submitted at a later date.

Trademarks.—Trademark registrations are granted under the Trade Name and Trade Marks Act (No. 21 of 1961) for 10 years from date of registration and may be extended for like periods. Registrations granted before November 11, 1961 are valid for 20 years. U.S. applicants must file through a resident agent or attorney in Indonesia. A trademark registration is subject to cancellation if not used within 6 months of registration and at least once every 3 years thereafter.

Administration of the country's industrial property laws and regulations is vested in the Directorate of Patents and Trademarks, Department of Justice.

Copyrights.—The Copyright Law in force in Indonesia is the Netherlands Copyright Act of 1912. The Netherlands is a member of the Universal Copyright Convention to which the United States and

about 60 other countries also adhere. Under its provisions, the U.S. author of a work who first publishes and copyrights it in the United States or any other member country has automatic protection for that work in the other member countries by showing his name, year of first publication and the symbol "c" in a circle.

Commercial Arbitration.—Indonesia does not have a Treaty of Friendship, Commerce and Negotiation with the United States. However, it has an Investment Guarantee Agreement which enables U.S. investors to obtain insurance through the Overseas Private Investment Corporation covering losses under

various financial and political contingencies. There are no procedures established for handling trade disputes, and foreign businessmen have not found the Indonesian court system a very satisfying forum for arbitration. Most trade disputes are settled by direct negotiation. The Superintending Company of Indonesia (SUCOFINDO) at Jl. Lt. Gen. S. Parman, 102, Grogol, Jakarta, Cable address: SUCOFINDO, is the leading surveying company employed in commercial disputes and has branches at the principal port cities. In mid-1976 Indonesian trade officials were developing a system of commercial arbitration procedures and regulations.

Appendix II

INVESTMENT IN INDONESIA¹

Foreign Investment Climate

The Indonesian Government welcomes private foreign investment to assist in the development of the country's resources and achievement of its economic potential. It grants tax and other incentives to encourage private foreign investment. The Government also expects foreign investors to respond to the objectives it has established for such investment. Thus, legislation restricts foreign investment in certain sectors, requires Indonesian coownership, and sets up requirements for the development of Indonesian manpower. It also limits the validity period of an investment approval (30 years) but provides opportunity for its extension, if certain standards are met. The implementation of the Foreign Investment Law of January 10, 1967 (Law No. 1 of 1967), as amended by Law No. 11 of 1970 in respect to tax holidays and other tax concessions, established a favorable investment climate. By the end of the first quarter of 1976 some \$4.6 billion foreign investments in the nonpetroleum sectors had been approved by the Government's investment board under the provisions of the 1967 law.

The investment climate has been negatively affected by the recession in the industrialized countries and uncertainties resulting from the Government's greater selectivity in project approvals, closing of additional areas to foreign investors, and response to demands of ethnic Indonesians (pribumi) for increased participation in the benefits of development. These factors resulted in a decrease of investment applications during 1975 and 1976.

President Suharto issued new policy guidelines for private foreign and domestic investment in January, 1974 which sought to strengthen local vs. foreign and indigenous vs. nonindigenous (e.g. ethnic Chinese) investors. Government spokesmen have emphasized, however, that the intention is to remain flexible and realistic in the establishment of new regulations for implementation of these policy objectives. Serious investors must take the time to do a thorough job in investigating the opportunities that

continue to exist within this new framework. Indonesia's Second Five-Year Development Plan (1974/75-1978/79) calls for a continuing high level of foreign direct investment.

Other factors affecting the investment climate include continued failure to decide on terms for new contracts in hard minerals, uncertainty over future GOI hydrocarbon policy, transportation and communication problems, escalating costs for land and housing, venality of some public officials, bureaucratic slowness in processing investment approvals and other government documentations, the new government rules in the petroleum sector, evidence of social disquietude, and all the other elements of uncertainty that are found in developing countries.

Investment Legislation

Investment Institutions and Procedures.—The Capital Investment Coordinating Board (BKPM), located at Jl. Taman Cut Mutiah 7, Jakarta, is the overall authority for both foreign and domestic investment and should be the first agency approached by most potential foreign investors. Exceptions are in minerals, petroleum, and forestry where special regulations apply and the appropriate departments (the Departments of Mines and Agriculture, and Pertamina (the State-owned petroleum company)) should be contacted.

In addition to approval by the BKPM, each foreign investment project must have presidential approval. While BKPM has responsibility for handling foreign investment approvals, other departments play important roles in the procedure. The Department of Finance must approve tax, import duty, and other exemptions and financial arrangements, while the department having overall responsibility for the sector in which the investment lies also has an interest in the investment application. The Department of Manpower will have to approve training and other factors affecting manpower. The potential investor will wish to have direct contact with the key government agencies concerned.

The basic procedure established for foreign investment approvals is that the prospective foreign investor submit to BKPM an application for investment, called a "Form A," along with a covering

¹ Based in part on OBR '77-05 "Marketing in Indonesia," March 1977, prepared by M. Virginia Webbert.

Letter of Intent, outlining the investment proposal. BKPM then evaluates the proposal in coordination with the concerned government departments. If the Form A is approved the investor submits a complete project proposal, Form B, which includes as much detailed information as possible including a list of capital and intermediate goods required, number of foreign and Indonesian employees required, location of the project, financial structure, corporate structure, market analysis, joint venture partner relationship, program for increased Indonesian participation etc. The investor proceeds to establish a limited liability company through an Indonesian notary. The presidential approval, based on recommendations by the BKPM, includes all relevant permits and legal documents, as well as confirmation of the tax relief although this is subject to change by the tax authorities), and other facilities extended to the investor by the Government. At a very early stage in the investigation of a likely investment opportunity the investor should consult the U.S. Embassy Economic/Commercial Section and select a local law firm or other consultant firm for advice on documentations and procedures. Foreign branch banks also provide help regarding investment.

Investment Assurances and Incentives.—The Foreign Investment Law grants investors the rights to remit profits, loan obligations, depreciation, and capital (but not while tax concessions are being given). It also provides assurances against nationalization and gives various tax incentives not always agreed to by the tax authorities. Exemption from corporation and dividend tax for at least 2 and up to 6 years may be given if an investment is in a priority area and meets other criteria in respect to location, size of investment, export earnings, use of Indonesian labor, or other priority objectives. Relief from import duty and sales taxes may be granted on items required for investment, and foreign employees of companies operating under the Foreign Investment Law receive certain duty-free imports. Since January 1974 investment incentives have been reduced. While the period of the initial investment contract may not exceed 30 years, contracts may be extended providing certain standards are met according to the law.

Areas Closed to Foreign Investors.—The 1967 investment law prohibited any foreign investment in industries vital to national defense (e.g., munitions manufacture) and full control in fields vital to the public welfare (e.g., harbors, electric power, telecommunications, aviation, shipping). Subsequent decrees or decisions prohibited new investment in sectors the government judged to be sufficiently developed or it wished to reserve for Indonesians. These include some 40 light industries (e.g., small tire manufacture, paint, cigarettes, soft drinks and

beverages, and batteries); automotive assembly and distribution; real estate, certain types of construction activities and textile manufactures; pharmaceutical plants in West Java; and certain resource areas such as shrimp fishing (except in West Irian). New investments in logging were banned in May, 1974, but not in wood processing industries, which the government wants to encourage. New foreign investment in bauxite, nickel and tin mining is prohibited, and in manganese mining on the islands of Java, Madura, and Bali. Investment in certain agricultural activities also is prohibited. The prohibitions are not necessarily complete since especially good proposals in these closed sectors may still be considered.

The policy guidelines stated by the President in January, 1974, indicated additional areas would probably be closed to foreign investors but the government apparatus has not yet fully clarified its operations in this regard.

Import, export, and local wholesale and retail distribution, including services related to trade or distribution, are generally reserved to national companies and Law No. 6 of 1968 requires foreign firms engaged in such activities on the basis of prior approval to get out of such activities within 10 years. However some exceptions to this requirement are anticipated.

Requirements for Indonesian Participation.—

While wholly owned investments were permitted under the 1967 investment law, investors had to provide for Indonesian participation at a later date through the sales of shares. In practice most approved investments outside the minerals sector were negotiated as joint ventures with initial local participation of 10%–20%, the increase to 25%–40% within 10 to 20 years. The new guidelines set out in January 1974 require that *all* new investments be initiated as joint ventures with ethnic Indonesian citizens (pribumi) and that local participation be 51% within a period of 10 years. The time period may vary with the nature of the industry and the size of the investment. The initial Indonesian participation in most cases is now likely to be 20%. Many foreign firms have Chinese or nonindigenous Indonesians as partners. In these cases at least 50% of the local partner's shares must be sold so that a minimum of half the local equity is held by ethnic Indonesians.

Requirements for Indonesian Manpower.—Although foreign investors are assured full authority to determine their own management personnel, they are required to meet other manpower needs with Indonesian nationals and to institute training programs to meet Indonesian manpower targets. Under the January 1974 guidelines, training programs are to be stepped up. Subsequently, specific requirements for "Indonesianization" of personnel have

been established in the forestry, mining, petroleum, textile and other industries.

Special Regulations for Minerals and Forestry.—While the basic investment legislation, Law No. 1 of 1967, applies to all investment areas, the exploitation of mineral and forest resources is subject to special regulations.

Foreign participation in the oil and gas industry may take place only under a production-sharing contract with the State-owned company, Pertamina (Perusahaan Pertambangan Minyak dan Gas Bumi Negara). As required by the National Constitution and based on Law 44 of 1960, all foreign oil companies operate as "service contractors" to Pertamina (specified under Law No. 8, 1971). Foreign oil companies bear all exploration expenses and risks. Pertamina has overall management authority. Except for leased equipment, any tangible equipment the foreign contractor brings into the country as its own property becomes the property of Pertamina.

Duration of the contract is usually 30 years. The unique feature of the production on sharing arrangement is that the contractor and Pertamina share crude, not income. The first contracts signed in 1967 featured a split of 65%–35% in favor of the GOI, they have subsequently been revised to give the Government of Indonesia greater revenues.

Exploitation of minerals other than oil is governed by Law No. 11 of 1967 which permits foreign companies to explore and develop minerals on the basis of a "contract of work" (Kontrak Karya) with the Government. Application for a contract of work must be made to the Minister of Mines, R/I, 18 Merdeka Selatan, Jakarta. The contract stipulates work stages (for a possible total of 41 years including 30 years of operation). No tax holidays are granted for corporation tax, but there is a considerable reduction of tax rates for the first 10 years, described under taxation below. Changes in the regulations governing investment in hard minerals have long been under consideration.

Investment in forestry is governed by Law No. 5 of 1967. Investment in logging even as a joint venture is now prohibited but foreign firms may serve as operating contractors for domestic logging companies and may invest in wood processing industries.

(For further details on investment procedures in the petroleum, mining, and forestry industries see the reports on these industries in this survey.)

Forms of Business Organization

The legal forms of business organization in Indonesia are patterned after the Dutch system. The following are among the most common:

1. The limited liability company (Perseroan Terbatas, or P.T., comparable to the Dutch Naamloze Vennootschap or N.V.). For most foreign investors, this type of organization is the only relevant form;
2. The full partnership, or Firma (Vennootschap onder Firma in Dutch or Fa.) in which all partners are personally liable for all obligations of the enterprise;
3. The limited partnership, or Perseroan Komanditer (Commanditaire Vennootschap in Dutch, or C.V.), in which one or more are "silent partners" responsible for obligations only up to the amounts of their capital participation, and in which those designated as "managing partners" are personally liable for all of the firm's obligations;
4. The cooperative (common among farmers and other small entrepreneurs);
5. The sole proprietorship or individual enterprise, Perusahaan Perseorangan, in which the owner is personally liable for all obligations of the firm he owns; and
6. The branch of a foreign business firm;
7. Representative office.

Organization of Foreign Firms.—The Foreign Investment Law provides that an enterprise operated wholly or for the most part in Indonesia as a separate business unit must be a legal entity organized under Indonesian law and have its domicile in Indonesia. As this article was subsequently elucidated, the entity must be organized as a limited liability company (P.T.), unless a firm is operating a branch, as foreign banks are permitted to do, unless special circumstances permit some other arrangement, such as a representative office.

Establishing a Limited Liability Company, P.T.—The legal characteristics of the company are specified in Articles 36–56 of the Indonesian Commercial Code. A limited liability company may be formed by foreigners alone, or by foreigners jointly with Indonesian nationals. A minimum of two persons is required.

The services of an Indonesian Notary Public are required to organize a limited liability company. The Deed must be in the Indonesian language, must use a name for the company which the Ministry will approve (containing the term Perseroan Terbatas or its abbreviation). In addition, it must state its capitalization in rupiahs (although the capitalization in another currency, in parentheses, may be given as well). The capital structure must be shown in the initial Deed of Establishment and certain percentages of the authorized capital must have been subscribed and paid in by the time the Deed is approved.

The limited liability of shareholders is recognized. Shares may be in bearer or in registered form, but in practice all shares held by foreign investors are required to be in registered form.

In view of the Indonesian Government's policy requiring 51% pribumi ownership of foreign investments within 10 years, investors have been exploring various means of satisfying these requirements while protecting their vital interests in the investment. The fact that Indonesian official spokesmen have affirmed that the Government's concern is with equity ownership and not necessarily management control provides some flexibility in approach. Six approaches for implementing Indonesian ownership of equity shares in foreign investments have been considered, these include:

(1) Partnerships, (2) Nominee Arrangement, (3) Stock-funded Employee Pension, Profit-Sharing and Bonus Plans, (4) Stock Market Sales and Private Placements, (5) Trustee Arrangements through Financial Institutions, (6) Government Holdings. These arrangements are often coupled with technical assistance, management, and financial agreements to insure the foreign investor's management control of the enterprise.

Partnerships have drawbacks which limit their use. In addition to the lack of the pribumi businessmen with requisite capital resources, the dilution of management control which is attendant to such arrangement is generally unacceptable. Financing by the foreign investor of the purchase of small additional percentages of equity by the Indonesian partner in a joint venture has been agreeable in some cases. Some foreign (and domestic Chinese) investors have used the transfer of shares to nominees, often to minor employees who hold the shares for the beneficial interest of the investor, as a means to satisfy pribumi ownership requirements. However, it is generally felt that this approach, essentially a facade, will not be acceptable in the long run.

Because of the embryonic status of the stock and capital markets, various approaches providing form stock acquisition, though appealing in concept, and unrealistic under prevailing circumstances. Current high interest rates on domestic time savings reduce the appeal of stock and bond ownership. Restrictions on the percentage of corporate equity which can be held by a pension fund are an additional limit on the use of stock-funded employee pension, profit sharing and bonus plans.

The great majority of stock transfers to Indonesian ownership will have to take place in other ways than partnership, nominee or stock market transfers. A number of foreign investors have employed trustee arrangements, whereby share title is transferred to an individual or institution to hold in trust on behalf of future pribumi purchasers. The eight

nonbank financial institutions established in 1974 as joint ventures between Indonesian State banks and foreign international banks have been the primary media for these arrangements. These institutions rarely purchase such stock, because they offer no assured investment return, but hold the stocks for future disposal in return for a service fee. The Indonesian Government has also acquired equity in joint ventures through several approaches, purchase of shares by BAPINDO the State Development Bank, direct participation, and joint ventures by state enterprises. It is anticipated that the detailed research and studies undertaken by foreign experts for the GOI will see the promulgation of the necessary Laws decrees and regulations to implement the establishment of stocks and capital markets in the near future.

Industrial estates.—Industrial estates offer a way around the many problems of foreign investors in obtaining land and land rights, building permits, site formation, and other infrastructure and facilities such as water, electricity, sewage system, telephones, and other support facilities.

The Pulogadung Industrial Estate, a 50-50 joint venture between the Central Government and the Jakarta Municipal Government, is in the eastern part of Jakarta, 15 km from the major port Tanjung Priok, 9 km from the Halim international airport, 12 km from the Kemayoran domestic airport, and a 35-minute drive from downtown Jakarta.

The US \$50 million project was financed by the World Bank. The development of the Pulogadung Industrial Estate, which started in 1970, is to be in three stages. The first two stages involving 285 hectares, have been completed, and the third stage is expected to be ready for sale in 1977. The total Pulogadung area is 570 hectares, with a plan to extend eastward for approximately 750 hectares of additional land.

The industrial estate is available to both local and foreign investors. Industrial land is available in plots of 5,000-7,000 square meters. Land can be bought for cash or by installments. The price includes land fill, contributions to infrastructure development, and cost for obtaining various permits for land use, building, etc.

There are no industries prohibited in the estate, although most firms are in the light to medium industrial field, making such products as glass, aluminum, textiles, oil country tools, food processing, and beverages. While there are no plans for an export processing zone or bonded warehouse in the estate, manufacturing companies can apply for private bonded warehouse licenses.

Facilities included in the plans for Pulogadung are 120 MVA of electricity, gas, water supply and

telephones. There is also a system to treat industrial wastes. There are other facilities such as a post office, banks, workshop for car repairs, restaurants, mosques, and churches. The estate also includes a World Bank-financed technical training center. As of mid-1976, between 75-85 firms had either located or were in the process of locating at Pulogadung.

An industrial estate is under development at Rungkut in Surabaya, East Java. The 200-hectare estate is designed to accommodate some 140 enterprises by 1980. The project is being aided by West German government loans, total investment will be around US \$50 million. The site is conveniently located—only 5 km from the city's Juanda Airport, 10 km from Surabaya's Tanjung Perak port, 5 km from the important Gubeng Railway station, 12 km from the town center, and 0.5 km from the principal north-south and east-west highways leading to Surabaya. Facilities are similar to those offered at the Pulogadung estate. As of mid-1976 there were 16 plants under construction at the Rungkut Industrial Estate.

Another industrial estate is the Lomanis Industrial Estate in Cilacap, Central Java—200 hectares in total area. The Australian Government has assisted in the project as well as in the program to develop Cilacap into Java's principal south coast deep-water port. This development has been spurred by the construction of several important industrial facilities in Cilacap, including a Pertamina oil refinery to process imported crude, a cement plant, a frozen sea food processing facility, a cattle fodder processing plant, a loading terminal for iron ore bearing sands exports, and a fertilizer bagging and distribution facility. Cilacap is over 200 km distant from the nearest airports in Jogjakarta and Semarang, but only 2 km from the Cilacap port, 2 km from the Cilacap railway station, and 1 km from main roads. Land will be available for sale in early 1977.

A fourth industrial estate is under development in Medan, North Sumatra, while others are in various stages of development or consideration in Semarang in Central Java, Ungjung Pandang in South Sulawesi, and Samarinda in East Kalimantan. The Batam Industrial Estate, in the Indonesian Riau Archipelago just south of Singapore, was designed by Pacific Bechtel Inc. of United States for Pertamina as an integrated industrial center mainly related to the oil industry. The Batam Island Development Authority took over responsibility from Pertamina for the project following the State Oil Company's financial debacle. Project implementation slowed considerably, although a number of firms have established themselves on Batam.

Taxation

The principal taxes of importance to the foreign investor are the company, or corporate tax; the personal income tax; the interest, dividend, and royalty tax; and the sales tax. Special corporate taxes apply in the minerals field. There are also property taxes, stamp taxes, a personal net wealth tax, excise taxes, motor vehicle or road taxes assessed by local governments, and a variety of other taxes. Investors producing for export may be subject to an export tax. Most taxes are subject to negotiation.

Corporate Taxes.—The Company Tax Law of 1925, as amended, provides for a 20% tax of net profits before taxes of up to Rp. 10 million plus 25% (i.e., a total of 45%) on profits in excess of Rp. 10 million. All types of partnerships and corporate bodies are subject to the company tax. The corporate taxes paid by oil companies in Indonesia are calculated under the terms of a production sharing arrangement. Companies producing minerals other than oil are subject to corporation taxes of 35% of taxable profits for the first 10 years of operation and up to 45% thereafter (according to a recent regulation, No. 21 of August 23, 1976, "Taxation and Other Levies Against Non-oil and Natural Gas Mining Operations"). No holidays from corporate tax are granted mining companies under the Foreign Investment Law.

Personal Income Taxes.—Both residents and non-residents of Indonesia are subject to personal income tax. Foreign individuals who work in Indonesia for a year, regardless of their intentions to reside in Indonesia are considered taxable residents. Those working for 3 months but less than a year are considered taxable nonresidents. Residents are taxed on all of their worldwide income from whatever sources. Dividends earned outside Indonesia are exempt, and foreign tax credit is granted.

Personal income tax rates are applied progressively to 19 brackets of income. The lowest rate of 10% applies to residual taxable income of less than Rp. 150,000, as of 1977, and the highest rate of 50% to income of Rp. 8,400,000 (about \$20,200) or more. This means that foreign personnel are generally paying a rate of 50% on a large portion of their income. There are personal and family tax deductions, and special deductions for foreigners earning income in foreign currency. As of 1977, for expatriates earning not less than \$9,000 annually, the taxpayer can deduct 10% of his net income to a maximum of \$1,200 annually for himself, 5% of his income to a maximum of \$780 for his wife, 5% to a maximum of \$780 for 1 to 3 children, and 7% to a maximum of \$1,200 for more than 3 children.

Interest, Dividend, and Royalty Tax.—A withholding tax of 20% is levied on payments of interest, dividends or royalties.

Sales taxes and export taxes are described under Trade Regulations, above.

While the Indonesian tax system underwent reforms in 1970 and 1972 which reduced rates, added investment incentives and simplified the system in general, it remains complicated by a large number of indirect taxes that are levied against commodities at various levels of production and distribution. There are no local direct taxes, except in the Special Region of Jogjakarta; however, there are numerous regional and local indirect taxes imposed, in some cases illegally. The tax system is poorly administered and, while there are ongoing efforts to improve its efficiency, tax evasion is part of business life for many firms and individuals. Tax liability is often established by negotiation under arrangements in which not all of the proceeds enter the state coffers.

The United States and Indonesia have been negotiating a Tax treaty for several years. Because of complications related to Law of Sea proposals the bilateral treaty will be delayed until the LOS problems are resolved. Taxes on exports were eliminated or reduced substantially in 1976 as a stimulus to producers in line with the Government's objective of increasing export earnings. It is Indonesian Government policy to encourage export-oriented industries. Export-oriented industries are considered as preferred or priority investments, particularly if they employ labor-intensive production methods. Foreign investments which are designed to produce for export markets are entitled to a year extra tax holiday. Certain export producers can receive rebates of import duties paid on components and raw materials incorporated into export products. Favorable rates are authorized to be extended to exporters and export producers. Credit may be extended up to a value equal to 75% of export stocks; as of mid-1976 rates charged by state banks for such credits were 18–21% per annum.

In addition to the bonded export processing zone established at Tanjung Priok port by P.T. Bonded Warehouse Indonesia, under certain circumstances private firms can establish their own bonded warehouses subject to the approval of the Directorate-General of Customs. Two types of private bonded

warehouse zones are authorized: (1) storage entrepôts to facilitate the handling of incoming goods by shipping companies, importers, and assemblers, (2) processing entrepôts managed by manufacturers and assemblers who process materials and components into finished goods, usually for export. These private bonded areas operate under customs supervision either inside the port area or at a factory location. Such facilities have been established by several vehicle assemblers, electronics, garment, and other manufacturing.

Export Regulations.—Since 1972, only Indonesian nationals are authorized to receive export licenses, except for foreign firms engaged in production for export who must obtain special licenses from the Ministry of Trade.

Currently exports to Angola, the People's Republic of China, Southern Rhodesia, Israel, and South Africa are prohibited. Exports of the following products are also prohibited: gold, certain categories of unprocessed or low quality rubber; cinchona bark; scrap bronze; copper, and iron (other than scrap bronze and copper from West Irian); and antiques of cultural value.

All exporters except the petroleum companies, the State trading firms, certain mining companies and certain barter traders must require their buyers to open an irrevocable bank letter of credit covering the value of the goods to be exported. These must be sight letters of credits opened by banks abroad approved by Bank Indonesia, unless the exporter concerned has deposited foreign currency with a foreign exchange bank sufficient to cover the expected export proceeds. Letters of credit must be valid for no less than 30 days after the date of the latest shipment.

Indonesian regulations require that the export proceeds, to the full amount of the actual f.o.b. price, be surrendered to Bank Indonesia through the foreign exchange banks. Exports of commodities, except certain manufactured or finished products and handicrafts which the Government is trying to encourage, and petroleum products, are subject to an export tax.

The foreign exchange bank deducts this tax, if applicable, before it reimburses the exporter. It also deducts the withholding tax (MPO) due as advance payment on income or corporation tax.

Appendix III

PRINCIPAL INDONESIAN GOVERNMENT OFFICES OF IMPORTANCE TO BUSINESSMEN

American businessmen may obtain listings of the names, addresses and telephone numbers of key government officials from the U.S. Embassy, Jakarta.

Department of Agriculture

Directorate-General of Food Crop Agriculture, J1.
Salemba Raya No. 16

Directorates of Food Crop:

Program Development
Production Development
Facility Development
Protection

Directorate-General of Forestry, J1. Salemba Raya
No. 16

Directorates of Forestry:

Program Promotion
Production Promotion
Operational Facility Promotion

Directorates of:

Reforestation
Natural Preservation and Protection

Directorate-General of Fisheries, J1. Salemba Raya
No. 16

Directorates of Fishery:

Program Promotion
Production Promotion
Facilities

Directorate of:

Biological Resource Development

Directorate-General of Livestock Breeding, J1. Salemba Raya No. 16

Directorates of Livestock:

Program Development
Protection Development
Facilities Development

Directorate of:

Cattle Health

Directorate-General of Estate Crops, J1. Jenderal
S. Parman No. 73

Directorates of Estate Crops:

Program Development
Production Development
Facilities Development

Agricultural Research and Development Board, J1.
Imam Bonjol No. 20

Centers for:

Food Plant and Soil R&D
Plantation and Forestry R&D
Livestock and Fishery R&D
Agroeconomic R&D
Agricultural Quarantine
Data & Statistics Processing

Agricultural Training and Extension Service, J1.
Ragunan, Pasar Minggu

Department of Communications

Directorate-General of Overland Transportation, J1.
Merdeka Barat No. 8

Directorates of:

Highway Traffic and Transportation
River, Lake, and Ferry Traffic and Transportation

Directorate-General of Maritime Transportation, J1.
Merdeka Barat No. 8

Directorates of:

Maritime Transport
Shipping and Sailing
Ports and Dredging
Navigation
Maritime Services
Sea and Coast Guards

Directorate-General of Air Transportation, J1. Merdeka Barat No. 8

Directorates of:

Air Traffic and Transportation
Aviation Safety
Airports
Telecommunications and Air Navigation

Directorate-General of Post and Telecommunications, J1. Merdeka Barat No. 8

Directorates of:

Postal savings
Telecommunications

Directorate-General of Tourism, J1. Merdeka Barat No. 8

Directorates of:
Marketing
Tourism Development

Communication Research and Development, J1. Merdeka Barat No. 8

R&D Centers for:
Overland Transport
Maritime Transport
Air Transport
Post and Telecommunications
Tourism

Department of Education and Culture

Directorate-General of Elementary and High School Education, J1. Hanglekir II

Directorate-General of College Education, J1. Proklamasi No. 17

Directorate-General Extra-Curricula and Athletic Education, J1. Senayan Jakarta

The Educational and Cultural Research and Development Board, J1. Menteng Raya No. 23

Educational and Cultural Research Center
Curriculum, Educational Facility and Cultural Development Center
Data, Statistical and Concept Processing Center;
Innovation and Educational Technological Development Center

Department of Finance

Directorate-General of the Budget, J1. Lapangan Banteng Timur No. 4

Directorate-General of Taxation, J1. Gatot Subroto No. 4

Directorates of:
Direct Taxes
Indirect Taxes
Planning, Receipts and Collection
Territorial Investigation and Control
Taxation Rules and Regulations

Directorate-General of Customs and Excises, J1. A Yani By Pass.

Directorates of:
Customs Duty
Excise Tax
Merchandise and Price Knowledge
Smuggling Suppression

Directorate-General of Monetary Affairs, J1. Lapangan Banteng Timur No. 4

Directorate-General of Auditing, J1. Lapangan Banteng Timur No. 4

Financial Educational and Training Board, J1. Purnawarman No. 99, Keb. Baru.

General Treasury Educational Center
Taxation Educational and Training Center
Customs and Excise Educational and Training Center
State Accountancy Educational and Training Center

Bank Indonesia (Central Bank), J1. M.H.Thamrin No. 2

Managing Directors for:
Foreign Affairs and Foreign Exchange
Supervision Development of Banks
Personnel, Administration Organization, and Money Capital Market
Money Supply and Credit

National Economic Development Planning Board (BAPPENAS), J1. Taman Suropati No. 2

Deputies for:
Material Development & Infrastructure
Monetary and Financial Planning
Regional and Local Development

Department of Health

Directorate-General of Public Health Promotion, J1. Prapatan 10

Directorates of:
Public Health Information
Planned Family Medical Service
Public Health Service
Nutrition

Directorate-General of Health Service, J1. Prapatan No. 10

Directorates of:
Hospitals
Dental Care
Psychiatric Health
Health Installations
Health Laboratories

Directorate-General of Drug and Food Control, J1. Prapatan No. 10

Directorates of:
Drug Control
Food and Drink Control
Cosmetic Control
Traditional Drug Control
Narcotic and Dangerous Drug Material Control

Directorate-General of Contagious Disease Prevention and Suppression, J1. Prapatan No 10

Directorates of:
Direct Contagious Disease Suppression
Epidemiology and Quarantine
Hygiene and Sanitation

National Health Research and Development, J1.
Prapatan No. 10

Centers for:
Health Service R&D
Biomedical Research
Health Ecology
Cancer and Radiological R&D

Department of Industry

Directorate-General of Metal and Mechanical Industry, J1. Gajah Mada No. 8

Directorates of:
Motor Vehicle Industry
Shipping Industry
Aviation Industry
Mechanical and Electronic Industry
Miscellaneous Metal Industry

Directorate-General of Chemical Industry, J1. Kebon Sirih No. 31

Directorates of:
Silicate Industry
Fertilizer and Petrochemical Industry
Cellulose Industry
Miscellaneous Chemical Industry

Directorate-General of Textile Industry, J1. K.H. Hasyim Ashari No. 6-12

Directorates of:
Spinning and Weaving Industry
Knitting Industry
Garment Industry

Directorate-General of Light Industry and Handicrafts, J1. Kebon Binatang II/8

Directorates of:
Food and Drink Industry
Leather Industry
Wood Industry
Miscellaneous Industry and Handicrafts

Department of Information

Directorate-General of Public Information, J1. Merdeka Barat No. 9

Directorate-General of Radio, Television and Film, J1. Merdeka Barat No. 9

Directorates of:
Radio
Television
Film Promotion

Directorate of Press and Graphic Development, J1. Merdeka Barat No. 9

Directorates of:
Press Development
Graphic Arts Development

Press Reporting Development
Publication

Information Research and Development Board, J1. Merdeka Barat No. 9

Department of Justice

Directorate-General of Law and Legal Provisions, J1. Taman Pejambon No. 2

Directorate of Patents and Copyrights, J1. Veteran 3/8A

Directorate-General of Immigration, J1. Cikini Raya No. 13

Department of Manpower, Transmigration, and Cooperatives

Directorate-General of Manpower Promotion and Recruitment, J1. Haji Agus Salim No. 58

Directorates of:
Labor Program Promotion
Labor Supply and Recruitment
Labor Development and Expansion
Skilled and Vocational Labor Promotion

Directorate-General of Labor Protection and Maintenance, J1. Haji Agus Salim No. 58

Directorates of:
Labor Relations
Labor Conditions and Social Security
Labor Safety
Labor Hygiene and Health

Directorate-General of Transmigration, J1. Haji Agus Salim No. 58

Directorate-General of Cooperatives, J1. Haji Agus Salim No. 58

Research and Development Board, J1. Haji Agus Salim No. 58

Department of Mining

Directorate-General of General Mining, J1. Gajah Mada No. 8

Directorates of:
Mining
Geology
General Mining Operational Facility Promotion

Directorate-General of Minerals, Oil, and Natural Gas, J1. M.H. Thamrin No. 1

Directorates of:
Mineral Oil and Natural Gas

Department of Public Works and Electric Power

Directorate-General of Irrigation, J1. Pattimura No. 20 Blok K III Kebayoran Baru

Directorates of:
Irrigation Program Development
Rivers
Irrigation
Irrigation Equipment
Water Problem Investigation

Directorate-General of Highways, J1. Pattimura No. 20 Blok K III Keb. Baru

Directorates of:
Highway Program Development
Highway Construction
Highway Maintenance
Highway Equipment
Land and Highway Problem Investigation

Directorate-General of Construction, J1. Pattimura No. 20 Blok K III Keb. Baru

Directorates of:
Construction Inspection
Environmental Engineering
City and Regional Planning
Construction Problem Investigation

Education and Training Center, J1. Pattimura No. 20 Blok K III Keb. Baru

Data and Statistical Center, J1. Pattimura No. 20 Blok K III Keb. Baru

Equipment Development Center, J1. Pattimura No. 20 Blok K III Keb. Baru

Department of Trade

Directorate-General of Domestic Trade, J1. Abdul Muis No. 87

Directorates of:
Distribution
Vital Commodities
Commercial Facilities Development
Trade Development
Metrology

Directorate-General of Foreign Trade, J1. Abdul Muis No. 87

Directorates of:
Export Trade
Import Trade
Foreign Trade Relations
Standardization, Normalization and Quality Control.

National Export Development Board, J1. Kramat Raya No. 94/96 (C.T.C. Building)

Development and Marketing Centers for:
Agricultural Products
Industrial Products
Industrial Handicrafts

★ U. S. GOVERNMENT PRINTING OFFICE : 1977 726-863/372

Commerce District Offices

Albuquerque, 87101, (505) 766-2386.
 Anchorage, 99501, (907) 265-5307.
 Atlanta, 30309, (404) 881-7000.
 Baltimore, 21202, (301) 962-3560.
 Birmingham, Ala., 32505, (205) 254-1331.
 Boston, 02116, (617) 223-2312.
 Buffalo, N.Y., 14202, (716) 842-3208.
 Charleston, W.Va., 25301, (304) 343-6181, Ext. 375.
 Cheyenne, 82001, (307) 778-2220, Ext. 2151.
 Chicago, 60603, (312) 353-4450.
 Cincinnati, 450202, (513) 684-2944.
 Cleveland, 44114, (216) 522-4750.
 Columbia, S.C., 29204, (803) 765-5345.
 Dallas, 75202, (214) 749-1515.
 Denver, 80202, (303) 837-3246.
 Des Moines, 50309, (515) 284-4222.
 Detroit, 48226, (313) 226-3650.
 Greensboro, N.C., 37402, (919) 378-5345.
 Hartford, 06103, (203) 244-3530.
 Honolulu, 96813, (808) 546-8694.
 Houston, 77002, (713) 226-4231.
 Indianapolis, 46204, (317) 269-6214.
 Los Angeles, 90024, (213) 824-7591.
 Memphis, 38103, (901) 521-3213.
 Miami, 33130, (305) 350-5267.
 Milwaukee, 53202, (414) 224-3473.
 Minneapolis, 55401, (612) 725-2133.
 New Orleans, 70130, (504) 589-6546.
 New York, 10007, (212) 264-0634.
 Newark, N.J., 07102, (201) 645-6214.
 Omaha, 68102, (402) 221-3665.
 Philadelphia, 19106, (215) 597-2850.
 Phoenix, 85004, (602) 261-3285.
 Pittsburgh, 15222, (412) 644-2850.
 Portland, Ore., 97205, (503) 221-3001.
 Reno, 89502, (702) 784-5203.
 Richmond, Va., 23240, (804) 782-2246.
 St. Louis, 63105, (314) 425-3302.
 Salt Lake City, 84138, (801) 524-5116.
 San Francisco, 94102, (415) 556-5860.
 San Juan, P.R., 00902, (809) 753-4353, Ext. 4555.
 Savannah, 31402, (912) 232-4321, Ext. 204.
 Seattle, 98109, (206) 442-5615.

Country Marketing Managers

Commercial and economic information on most trading partners of the United States is available from the U.S. Department of Commerce.

A Country Marketing Manager is responsible for a country or group of countries as listed below. Assistance or information about marketing in these countries may be obtained by dialing these key people directly: 203-377 plus the given extension.

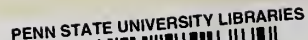
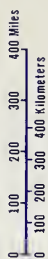
Bureau of International Commerce

Area	Extension
<i>Africa</i>	3865
Algeria, Libya, Morocco, Tunisia	5737
Remainder of Africa (except Egypt)	3865
<i>Europe</i>	
France and Benelux Countries	4504
Germany and Austria	5228
Italy, Greece and Turkey	3944
Nordic countries	3848
Spain, Portugal, Switzerland and Yugoslavia	2795
United Kingdom and Canada	4421
<i>Far East</i>	
Australia and New Zealand	3646
East Asia and Pacific	5401
Southeast Asia	2522
<i>Latin America</i>	
Brazil, Argentina, Paraguay and Uruguay	5427
Mexico, Central America, and Panama	2313
Remainder of South America and Caribbean countries	2995
<i>Near East</i>	
Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Peoples Democratic Republic of Yemen, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen Arab Republic	5767
Iran, Israel, Egypt	3752

Bureau of East-West Trade

Eastern Europe	2645
USSR	4655
Peoples Republic of China	3583

Railroad —
Road —



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